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Determinants of under-five mortality in South Africa: A logistic regression.

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Plagiarism declaration

DECLARATION

I declare that ***determinants of under-five mortality in South Africa; A logistic regression*** is my own work, that it has not been submitted for any degree or examination in any other institution, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

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LIST OF ABBREVIATIONS/ ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
ARR	Average rate of reduction
ARV	Antiretroviral
ART	Anti-retroviral therapy
CSSR	Centre for social science research
DHS	Demographic and Health Survey
EPI	Expanded Program of Immunization
EC	Eastern Cape
FS	Free State
HSRC	Human science research council
MDG	Millennium Development Goal
ORT	Oral Rehydration Therapy
OR	Odd ratio
SPSS	Statistical Package for Social Sciences
UNICEF	United Nation's Children and Emergency Fund
WHO	World Health Organization
HAART	Highly active antiretroviral therapy
PSU'S	Primary sampling units
PMTCT	Prevention of mother to child transmission
IMCI	Integrated Management of Childhood Illnesses
UNICEF	United Nations children fund
SADHS	South African Demographic health survey
SDG'S	Sustainable development goal
NCD S	Non-communicable disease
UN-IGME	United Nations inter agency group for child mortality

STATSSA	Statistics South Africa
WC	Western Cape
LP	Limpopo province
MP	Mpumalanga province
NW	North West
NC	Northern Cape
PSU	Primary Sample Unit
SA	South Africa

ABSTRACT

While several interventions have been implemented over the past decade to combat child mortality, under-five mortality remains a challenge especially in Sub-Saharan Africa. Globally, child mortality has decreased to half from 12.7 million in 1990 to 5.9 million per year in 2015. Despite these remarkable gains, more than 16,000 children are dying daily in the world (World Health Organisation, 2015). Previous studies on child survival have examined the contributing factors of child deaths and HIV/AIDS epidemic and socio-economic differentials such as the level of education, type of place of residence,and mother's occupational status were identified as the contributing factor towards the high rate of under-five mortality. However, there is a paucity of studies focusing on the impact of socio-economic and demographic factors on under-five mortality. Hence this study aims to explore the impact of socio-economic and demographic factors on under-five mortality in South Africa.

There are underlying factors or background determinants (including direct and indirect) of under-five mortality. These factors influence under-five mortality in South Africa, and the direct causes are called proximate determinants or demographic factors. The conceptual framework of Mosley and Chen (1984) was adopted to explore the ways of influence of the underlying factors on under-five mortality in their study of determinants of child survival.

The survey data drawn from 1998 South African Demographic health survey on the sample of N=11735 among women aged 15-49 who have ever given birth was used for the analysis of objective two and three. Firstly, for objective 1, which compares the levels of under-five mortality across the provinces from the period of 2000-2015 the trend analysis was done, and the estimates of under-five mortality were computed using direct method to under-five mortality rate. The data for objective 1 was drawn from the recorded total number of live births and deaths in the statistics South Africa website (superweb) which captures the vital registration statistics for the period of 2000-2015. For objective 2, which estimates the impact of socio-economic variables on under-five mortality, a univariate analysis of descriptive statistics was carried out to measure the characteristics of the sample used and to ascertain variables which shows statistical significance. Also, for objective 3, which estimate the impact of demographic variables on under-five mortality in South Africa, as well as the association of demographic characteristics of mothers who experienced under-five mortality, a univariate analysis was conducted in order to see the characteristics of the sample and the variables which showed a statistical significance. Subsequently, binary logistic regression model was

employed to understand the predictive ability of factors that influence the odds of under-five mortality at the bivariate level to meet the aims of the study.

At a univariate level, all the variables showed a statistical significance. The results revealed that females that have no education had the highest rate of under-five mortality of (23.5%) than those who obtained at least primary education (16.8%) of under-five mortality. For those mothers who obtained the secondary education and higher education under-five mortality was (9.6%). Age of the mother also showed a statistical significance at a Univariate level. Under-five mortality was very high among the mothers aged 15-19, these mothers reported (39.8%) of under-five mortality. Highest rate of under-five mortality for mothers aged 40-44 was 22.3% than those aged 44-49 (24.8%). The study will enable policy makers and programmes to reduce under-five mortality by improving health facilities such as hospitals and by increasing level of education among South African women. Based on the results, it can be concluded that, type of place of residence, region, maternal education, mother's occupational status and demographic factors such as maternal age, birth order, birth interval and lastly sex of the child have more impact in predicting the likelihood of under-five mortality. However, from the logistic regression model variables such as mother's occupation and birth order did not show any statistical significance. Lastly, the study's results could help the department of health to improve level of birth spacing by supplying contraceptives to prevent too many births that take place within a very short space of time.

Keywords: Under-five mortality, maternal age, Mother's highest education level, Type of place of residence, Health-care.

CHAPTER 1: INTRODUCTION

1.1 Preamble

Under-five mortality is defined as the death of a child between birth and age of five years (United Nations,2014). Although, most of the deaths that occurred at the early stage of life are known to be preventable, under-five mortality continued to be a current issue in the field of public health in the Sub-Saharan African countries (United Nations, 2014). Reducing under-five mortality by two thirds was one of the millennium development Goals (MDGs) proposed by United Nations in 2000 whereby goal 4 is dedicated to reducing under-five mortality globally by two-thirds between 1990 and 2015 (UNICEF, 2013). So, this means under-five mortality was expected to be 20 per 1000 live births in all the regions of Sub-Saharan Africa. Reducing the social phenomenon of under-five mortality was also one of the focus of the newly adopted Sustainable Development Goals (SDGs) which was proposed by global leaders in 2015 by the end of MDG 4 which aimed to reduce under-five deaths to 25 or fewer per 1,000 in 2030 (United Nations, 2014).

According to the World Health Organisation (WHO) (2006) for the first time in 2006 there was a decrease in mortality cases that were reported among children dying before the age of five globally. The value was observed to fall below 10 million (Buwembo, 2010). However, this decline has not been consistent because there were still some regions that experienced high rate of under-five mortality. The WHO (2006) estimates that on average about 15% of new-born children in Africa is expected to die before they reach their fifth birthday. Under-five mortality rate is very high in Sub-Saharan Africa where there is a widespread of HIV/AIDS epidemic. The estimated under-five mortality rate exceeds 200 deaths per 1000 live births in ten countries in this region. In addition, child mortality rates remain very high in South Asia (World health organisation, 2006).

Despite the observed improvements made globally in reducing high under-five mortality, MDG 4 remains largely unachieved in less developed countries. To increase the pace of child mortality reduction, several interventions with high impact need to be implemented in order to meet MDG 4 which aims to reduce under-five mortality by two thirds. Evidence shows that the rate of decline of child deaths has been accelerated from 1.2% per year during the period of 1990 and 1995, to 3.9% per year between the period 2005 and 2012 (Stats SA,2015). Although progress was observed during the period in reducing global child mortality rate, it is estimated that globally 6.6 million children under the age of five still die every

year which clearly suggests that 18,000 children under the age of five still die each day regardless of the improvements. Huge disparities of child mortality were observed among low- and middle-income countries and the industrial world with Sub-Saharan Africa and South East Asia having the highest burden of under-five mortality (UNICEF,2013).

According to a report by UNICEF (2013) children aged 0-4 years in sub-Saharan Africa have the highest risk of death in the first month of life and are still leading in under-five mortality rates with one in every nine children dying before their fifth birthday as of 2011. Buwembo (2010) have shown various socio-economic factors that influence child health and survival. These are type of place of residence, mother's age, mother's education, place of delivery, birth order, sex of child, religion of parents, household headship and household socio-economic status.

It has been estimated that globally under-five mortality rate has declined by 30% between the period of 1990 and 2007 with children's survival chances increasing in 95% of countries (World Health Organization, 2006). However, childhood deaths may differ among regions and over time the differences increase due to changing socio-economic status of countries which may have a higher impact on under-five mortality rates. Developed countries with highly developed economies and advanced medical technologies, enough diets, and adequate public sanitation, experience under-five mortality rates that are quite very low (below 5 per 1,000) (Buwembo,2010). In contrast, in countries with low status of development with the disadvantages of poor diet, limited access to medical technology, and other problems of poverty and public sanitation, the rates tend to be as high as over 100 per 1,000 live births (Buwembo, 2010).

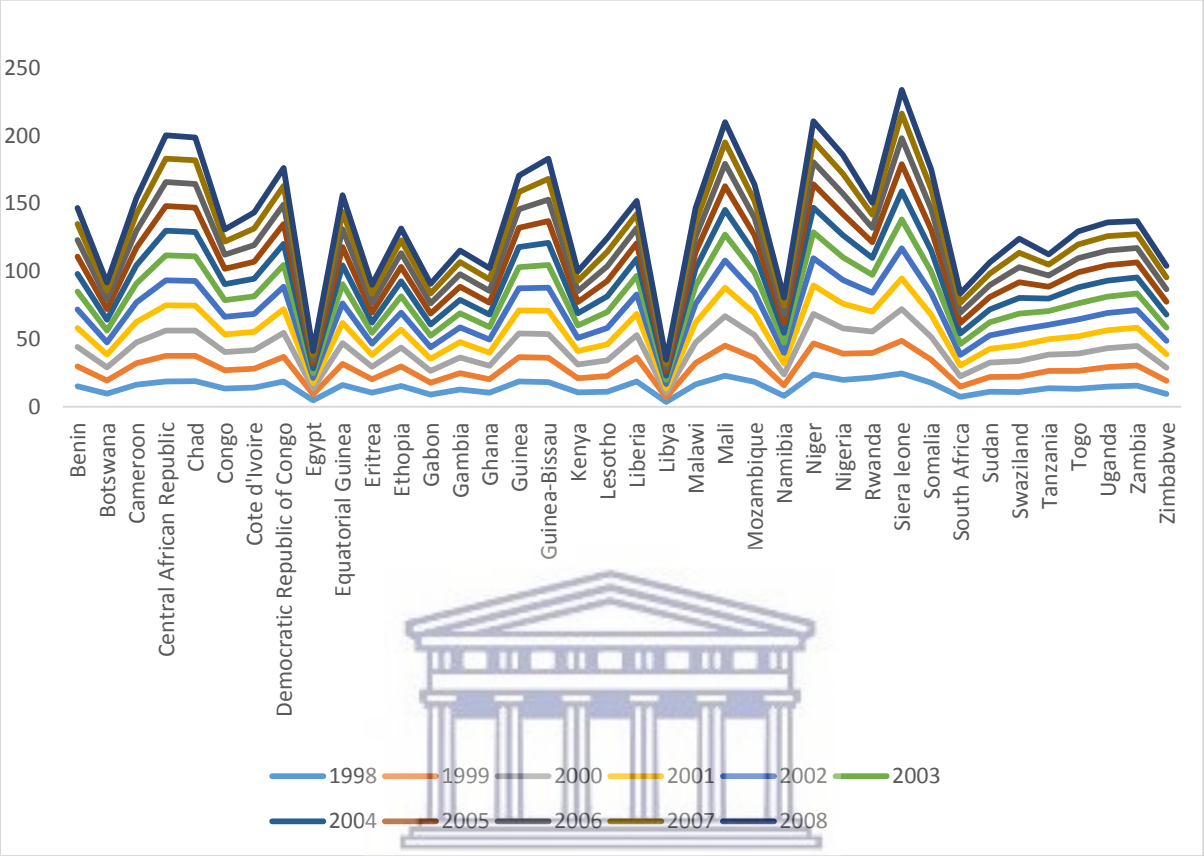
Reducing under-five deaths has been one of the topics of interest to many researchers. This social phenomenon is one of the key measures of a country's health system, and rates of child mortality of an area have long been confirmed as important indicators of health status and socio-economic development of the country (WHO, 2012).The United Nations report (2012) on child mortality reveals that child mortality has declined from 61 deaths per 1000 live births in 1990 to 45 births per 1000 live births in 2012. Whiting (2013) states that the health of infants and children in South Africa largely depends on the most influential factors which are social and economic conditions under which they live and approximately 66% of children in this country live in poverty with a monthly income of less than R1200 per month. Under-five mortality in South Africa has been found to be much higher in certain geographical areas

and disadvantaged social groups. The differences are very huge and the role of factors such as socio-economic and demographic determinants should not be ignored, Since the decline was observed in HIV and AIDS related deaths due to the roll out of initiatives such as Prevention of mother to child transmission (PMTCT), anti-retroviral drugs (ARVs) and increase in immunisation coverage to 90 per cent (Rademeyer, 2017).

Under-five mortality in South Africa has been found to be much higher in certain geographical areas and disadvantaged social groups. The differences are large and increasing. Rademeyer (2017) states that although South Africa has progressed well in combating higher under-five mortality rates, its child mortality rates were still higher than other countries that have similar economic status. These are countries such as Brazil and Mexico as well as a number of other less developed countries including Namibia, Indonesia, Bangladesh and many of the North African Countries. However, on the contrary while the above-mentioned countries had alarming under-five mortality rates a remarkable progress was observed in countries such as China, which had the similar economic status.

China showed a reduction of under-five mortality rates from 28.4 percent to 13 percent in 2013 (Sohail, 2017). Rademeyer (2017) argues that even though there was a substantial progress in reducing under-five mortality rates in the period of 1990-2012 South Africa has attained a reduction of approximately 26 percent, which is why Millennium Development goal 4 of rates of 18 and 20 per 1000 live births was not attained by 2015. When the MDG 4 matured in 2015, international community leaders and United Nations proposed and agreed on the agenda for sustainable development goals which was presented globally, and 17 sustainable development goals were set for 2030 (United Nations, 2015). SDG goal target 3.2 is to reduce the infant and under-five mortality rate by 2030 and the target are to slow under-five mortality rate to 25 per 1000 live births (United Nations,2015)

Figure 1: 10-year trend analysis for mortality rate by country in Sub-Saharan Africa per 1000 live births from 1998-2008.



Source; Data Source from https://ourworldindata.org/child-mortality

The above figure 1illustrate the 10 year trend analysis of under-five mortality in Sub-Saharan African countries from the period of 1998-2008. From the above figure 1 two trends can be observed throughout the years some countries such as Sierra Leone, Nigeria,and Mali showed high rates of under-five mortality whereas a decline was observed in countries such Egypt and Benin. Sierra Leone continued to show the highest under-five mortality rate from the year 1998-2008. In 1998 Sierra Leone reported 24.61 of under-five mortality rate whereas there were countries that reported lower rates of under-five mortality, these were Egypt that reported 4.17 and Libya reported 3.34 under-five mortality rate. The above graph provide evidence that the rates of under-five mortality vary according to the type of region and residence these variation are due to the status and economic standing of each and every country.

1.2 Stylised facts

According to Buwembo (2010), during the period of 1980 under-five mortality in South Africa was estimated to be 91 deaths per 1000 live births and this declined in the following decade to 60 deaths per 1000 live births. During the era of 1990-2000 the level of children / infant mortality slightly increased to 69 births per 1000 live births. This trend continued, and 2006 figures indicate a decrease to 63 deaths per 1000 live births. This is indeed a great concern as these levels were moderately higher. Omar *et a*l., (2000) states that the accelerated rate of decrease that was observed in the above figures was not maintainable due to the slow rate of economic development, influence of the AIDS epidemic and other neonatal diseases, and lastly the infusion of sophisticated technology driven by public health intervention in the provinces. This was because there were still few rural provinces of the country that were still lacking health resources that could slow the rate of child mortality. According to Motsa (2014), the lack of progress in South Africa in reducing under-five mortality has increased by 17% between 1990 and 2006 with deaths rising from 125 to 146 per 1000 live births. Therefore, the region required a 13% average annual rate of reduction in under-five mortality rate between 2007 and 2015 in order to achieve millennium development goal four in 2015.

In most sub-Saharan African countries, studies have shown that the mortality of children under-five years is often influenced by socio-economic factors and related illnesses (Union for African Population Studies, 2009). Gebretsadik & Gabreyohannes (2011) found that under-five mortality is a leading indicator of child health and overall development of a nation as it reveals the social, economic, and environmental conditions children live in. Abir *et. al.,* (2014) states that the number of under-five deaths globally declined from nearly 12 million in 1990 to 6.9 million in 2011. This clearly explains that 14 000 fewer children were dying each day in 2011 than in 1990. According to the report released by WHO (2016) In 2015, up to 5.9 million children were reported dead and more than half of these early child deaths were due to the conditions or illnesses that could be prevented at an affordable intervention. Leading causes of death in children under-five years are preterm birth complications, pneumonia, birth asphyxia, diarrhoea and malaria. About 45% of all child deaths are linked to malnutrition.

1.3 Research problem statement

Under-five mortality is a social problem occurring in most parts of the world including South Africa. The outcome of pregnancies and the survival of children who are under the age of five years is highly influenced by access to basic health services and quality of socio-

economic services that are made available to the population at large. Several research studies have explored theoretically and empirically the consequences of this social phenomenon. Rural mothers and their children are more disadvantaged compared to their urban counterparts in terms of access to basic health services. The United Nations Children Fund (UNICEF, 2009) has reported that the lack of access to basic health services is a key indicator of maternal & child mortality and morbidity in South Africa and in most Sub-Saharan African Countries.

The devastating implications of high under-five mortality are felt both at societal and familial levels. At the societal level, high under-five mortality is indicative of poor and inadequate basic health infrastructure to fight poor sanitation, environmental hazards and living conditions to the extent that infectious and parasitic diseases will be prevalent (Kyei, 2011). High under-five mortality has negative consequences on the socio-economic growth of populations as it diminishes the age group that is expected to participate in the economic development process of the country. However, at the familial level, Kyei (2011) states that the loss of children brings pain and sorrow to the families and even the community at large. Therefore, high under-five mortality deprives affected nations, communities and families of future socio-economic development.

Under-five mortality continues to be high in many countries in Sub-Saharan Africa; these countries include Lesotho, Swaziland, Zambia and Zimbabwe (Motsa, 2014). In these countries, infant mortality rates remain strikingly high and fluctuate despite the efforts to improve child survival. These efforts include compulsory immunisation, antenatal care, postnatal care and overall improvement in the prevention and treatment of deadly infectious diseases such as HIV/AIDS, cholera, diarrhoea and malaria. The lack of progress on child survival in Southern Africa has increased by 17%between 1990 and 2006 with deaths rising from 125 to 146 deaths per 1000 live births (UNICEF, 2008). Subsequently, the region required a 13.9% average annual rate of reduction (AARR) in under-five mortality rate between 2007 and 2015 for the achievement of Millennium Development Goal 4 by 2015 hence this goal remained unachievable in 2015 (Motsa,2014).

Studies conducted by Buwembo (2010), Mosley and Chen (1984) and Kuate-Defo (1994), revealed that under-five deaths are highly influenced and/ or determined by various social, economic, demographic, environmental, cultural or behavioural factors. Some of these factors influence under-five mortality directly and others affect it indirectly (Buwembo, 2010; Kuate-

Defo, 1994; Mosley and Chen, 1984). Those factors that have indirect effects on under-five mortality are referred to as the underlying (or background) factors. Examples include mother's education, wealth status, place of residence, religion, etc. While, those factors that have direct effects on under-five mortality are called proximate determinants. Examples of such variables include birth order, type of birth, breastfeeding and immunisation.

Under-five deaths have been a major problem facing many South Africans and it is characterised by large regional differences across the provinces. These differences are strongly associated with the levels of socio-economic disparities. South Africa is geographically separated into nine provinces: Western Cape (WC), Eastern Cape (EC), Northern Cape (NC), Free State (FS), Gauteng (GT), North-West (NW), KwaZulu-Natal (KZN), Mpumalanga (MP) and Limpopo (LP). Despite the efforts and interventions that are implemented, child deaths remain very high and fluctuate yearly in these provinces. There are special interventions and efforts implemented to decrease the rate of child mortality. These efforts include compulsory immunisation, antenatal care postnatal care and the overall interventions such as prevention and treatment of infectious disease such as diarrhoea, malaria and cholera (Motsa, 2014).

Furthermore, under-five mortality varies in all the above-mentioned provinces, they all experience different rates of child mortality as they all differ economically. For instance, according to report by HSRC (2014), in the poorer provinces like Limpopo province, Eastern Cape and Mpumalanga province there are lower levels of infrastructure development (housing, water, sanitation, electricity, etc.), education and income, higher unemployment rates, and poor health care services (UNICEF 2013; HSRC 2014). As opposed to poorer provinces, in richer provinces like WC and GT there are better infrastructure development, higher income and education levels. Child mortality rates in the poorer provinces are usually estimated to be very high compared to the rich provinces (Buwembo, 2010).

1.4 Research hypothesis

1. There are variations in levels of under-five mortality in South Africa across provinces.
2. Socio-economic variables have significant effects on under-five mortality in South Africa.
3. Demographic variables have significant effect on under-five mortality in South Africa.

1.5 Research questions

1. What are the variations in levels of under-five mortalities in South Africa across provinces?
2. What is the impact of socio-economic variables on under-five mortality?
3. What is the impact of demographic variables on under-five mortality?

1.6 Research objectives

1. To compare the levels of under-five mortality in South Africa across provinces.
2. To estimate the impact of socio-economic variables on under-five mortality in South Africa
3. To estimate the impact of demographic variables on under-five mortality in South Africa

1.7 Significance of the research

Accurate estimates of child mortality at a provincial level are very important for a country in order to evaluate the effectiveness of the existing programmes as well as for policy-making and planning. In addition, studying child survival in relation to socio-economic and demographic factors will help the policy makers to make more informed and effective decisions that may help the country to reduce high under-five mortality rates. Many of the studies conducted so far on child mortality in South Africa lack comprehensiveness in that they focus only on country level or in specific geographical areas. There are few studies which attempt to estimate child mortality at the provincial level, and most of the studies that have been conducted fail to adequately explore child survival in relation to socio-economic and demographic determinants. Instead, they examined the impact of HIV/AIDS on under-five mortality and overlooked other factors that may have an impact on child survival.

Against this backdrop, this research is unique because it will provide new provincial estimates of child mortality for South Africa. An empirical study that focuses on the impact of socio-economic and demographic determinants of child mortality is important for the provincial departments of health as it will indicate inequalities in socio-economic conditions and access to health care services in different provinces. It will also give more information on mother's perinatal level of access in different provinces of the country as explained by the type of place of residence. Specifically, it is worth noting that:

1. Investing in the health and wellbeing of children in South Africa is an investment for the future development of the country as the children are the population that is expected to participate in future economic development.

2. Also, focusing on the impact of socio-economic variables on child mortality will help the country to make more informed and effective decisions in order to improve government's policies aimed at reducing under-five mortality. Furthermore, the present study will fill gaps in existing studies, which are explained below in order to understand the phenomenon of child mortality.

3. More importantly the study's findings will contribute to the existing literature on socio-economic and demographic determinants of infant and child mortality, especially as it is related to women.

4. Last but not the least, the data obtained from this study can be used for strategic and national planning as well as in measuring socio-indicators such as the quality of health care, nutrition, family planning practice and usage.

1.8 Aims and objectives of the study

The present study seeks to examine the impact of socio-economic factors and how these determines the likelihood of under-five mortality among the provinces and how these determinants influence the level and the rate of under-five mortality in overall South Africa.

The study aims to achieve three objectives, the first objective attempt to compare the levels of under-five mortality rates across the provinces using the total number of live births and deaths at a given period of 2000-2015 that were recorded in the vital registration system of Statistics South Africa. Then the second objective estimate the impact of socio-economic determinants on under-five mortality rates and lastly the third objective is to estimate the impact of demographic factors on under-five mortality rates.

1.9 Conceptual definitions

Mother's age at birth, under-five mortality rate, sex of the child, region, type of place of residence, mother's education, birth order, birth interval and mother's occupational status are the selected variables for the present study. The present study seeks to understand more the impact of the above mentioned variables in determining the likelihood of under-five mortality. Before going deeper on examining the impact of these variables on predicting the under-five mortality it is much more important to understand more how these variables were selected

and how are they going to be used in the present study to examine their predictive ability of under-five mortality.

Mother's occupational status:

Parental occupation determines the wealth status of the household. Evidence shows that mother's occupation may affect the amount and the quality of food intake that the children are entitled to, type of shelter and access to health care services available for children living in the household (Ahonsi, 1992). This variable is more significant to be studied as the determinant of under-five mortality as it measures mother's wealth status which significantly plays more important role in predicting the occurrence of under-five mortality. However Buwembo (2010) found that the mother's working status may have a negative influence on under-five mortality if the mother reside at a distance from home.

Birth Interval:

Birth interval is another key determinants of childhood mortality and influences it through breastfeeding, survival status of the preceding child, multiple pregnancy etc., (Kayode *et a*l., 2012). Short birth interval have a strong association on child survival, because this may lead to early weaning of a child and may cause maternal depletion syndrome which drains the mother's strength and can result in poor birth outcomes (low birth weight and prematurity(Gbemisola,2014).

Type of Place of residence:

This variable is defined by the study as to whether the person resides in urban or rural areas. Evidence shows that children living close to health care facilities tend to experience lesser risk of deaths compared to their counterparts who live at a distance from the health facility (Tette and Owusu, 2014). This can be said to be a typical experience of households in the rural areas of most developing countries. Urban areas usually have better infrastructures for health care facilities and are built close to the residential areas. Rural-urban residence have been found to be another strong determinant of child's well-being (Mutunga, 2004). This is more significant to be studied as a determinant of under-five mortality due to the role it plays by either determining the likelihood of under-five mortality.

Region:

This variable was defined in the study as different types of provinces included in the analysis of the trend in South Africa. These include 9 provinces: Western Cape, Eastern Cape, Kwa-Zulu-Natal, Limpopo, Free State, North West, Northern Cape, Gauteng Province and Mpumalanga province. This is an important variable to study in relation to under-five mortality to see the effect it has on the occurrence of under-five mortality in South Africa.

Mother's age at first birth:

Several studies have shown that there is a strong relationship between maternal age and child survival. Although, this association is intermediate by other factors such as sanitation, immunization, breastfeeding and previous child deaths (Hobcraft et al, 1985; Kayode et al, 2012). In a study conducted by Buwembo (2010), under-five mortality was very high among teenage mothers compared to mothers who were well matured before having their first birth (above age 20 years). This is because, mothers who are well matured (age 20 and above) before having their first child would have adequate knowledge about child care either formally or informally (Buwembo, 2010). This is because mothers who are above the age of 20 are well informed and knowledgeably about ways of taking care of their new-borns compared to the young teenagers who are between the ages of 15-19. Studying maternal age in relation to the under-five mortality is more important as it shows how strong and well informed is the mother of the new-born.

Under-five mortality rate:

Under-five mortality is defined in this study as the probability of dying between age 0 and five years (i.e. the probability of dying between age 0 and 59 months).

Maternal Mortality:

maternal mortality is defined in the study as the death of the mother of the foetus while preg nant.

Neonatal Mortality:

Neonatal mortality refers to death of a live-born baby within the first 28 days of life. Early neonatal mortality refers to the death of a live-born baby within the first seven days of life, while late neonatal mortality refers to death after 7 days until before 28 days.

***Infant Mortality*:**

In this study, infant mortality is defined as the probability of dying before the first birthday (i.e. the probability of dying between age 0 and 11 months).

Child mortality:

This is defined in this study as the probability of dying between the first and fifth birthdays (i.e. the probability of dying between age 12 and 59 months).

CHAPTER 2: BRIEF REVIEW OF RELATED LITERATURE

This section explores the related theoretical and empirical literature. Firstly, theoretical literature from Scholars such as Mosley and Chen are reviewed and adopted to explain the effects of socio-economic and demographic variables on under-five mortality. The theoretical and empirical knowledge identified in this present study will help to fill research gaps that exist in this field. Moreover, the section includes the causes, drivers, and impacts on mothers and their children, factors associated with under-five mortality and the long-term effects or consequences of this social issue.

2.1 Theoretical Literature

2.1.1 *Objective 1*: To compare the levels of under-five mortality in South Africa across provinces.

A 2014 report by the United Nations Interagency group reveals that globally the pace of under-five mortality rate is declining faster than during the past two decades. The global annual rate of reduction has gradually accelerated since 1990–1995 increasing from 1.2 percent to 4.0 percent between 2005-2013 (UN-IGME, 2013). Despite these observed improvements, progress made was not enough to reach MDG 4 in 2015, particularly in Oceania, Sub-Saharan Africa, Caucasus and Central (Buwembo,2010). Hence MDG 4 remained unachievable in 2015 (Rademeyer, 2017). The report released by the United Nations (2015) revealed progress made in decreasing child mortality during the period of 1990-2015, under-five mortality rate dropped from 91 per 1000 live births to 43 per 1000 live births, which is 53% drop. In the same period, annual child mortality rate decreased from 12.7 million to 5.9 million. Since 1990, well developed and developing countries both reduced child mortality. More developed countries had low child mortality rate of 15 deaths per thousand live births in 1990, which was reduced to 6 in 2015, which is 60% decline from 1990, while developing countries had 100 deaths per thousand live births which was reduced to 47 in 2015, with 54% decline from 1990 (United Nations, 2015).

According to the United Nations Interagency group (2015), substantial progress has been made in declining the rate of under-five mortality. Globally, the rate of under-five dropped 53% from 91 deaths per 1000 live births in 1990 to 43 deaths in 2015. In addition, in 2013, 6.9 million children died under the age of five which is 64 % less than the 17.6 million in 1970 (Wang, 2014). Some countries such as China reduced under-five mortality from 28.4 % to 1.3 % in 2013 (Roser, 2017).

Although there was a global decline of 53 percent between 1990 and 2015 the rate remained high in developing countries such as South Asia and Sub-Saharan African countries. The number of under-five deaths at a global level has declined from 12.7 million in 1990 to 5.9 million in 2015. That accounts for 16 000 child deaths every day as compared to 35 000 child deaths daily in 1990 (Roser, 2017). This has been an encouraging progress in recent years and has saved millions of lives of children under the age five. However, the pace of reduction was not the same in the developed and the developing countries. Rademeyer (2017), found a remarkable progress of 60% drop and the developing countries were behind by 53 %. The remarkable progress in accelerating the rate of reduction of under-five mortality has saved the lives of 48 million children who were under the age of five years.

The leading causes of child mortality in two regions with highest under-five mortality were attributed to preterm birth issues in South Asia and Pneumonia in Sub-Saharan Africa (Sohail, 2017). Moreover, Liu *et al.*, (2016) also noted that preterm birth related issues as the important cause in all high, medium high and medium under-five mortality affected countries, while congenital issues were for the countries with very low or low under-five deaths. Wang *et* al., (2016) found diarrheal diseases as the most important cause of child mortality in 2015. According to Chola *et al.*, (2015) one in two deaths in children under the age of five years results from diarrhoea and the highest number of deaths were recorded from Sub-Saharan Africa and South Asia Diarrhoea accounts for death of one in nine children.

Chola *et al.*, (2017) further argues that diarrhoea and socio-economic status have the most adverse effects in South Africa. Furthermore, children who reside in impoverished communities are approximately ten times more likely to experience child deaths that are due to diarrhoea than their privileged counterparts. Despite these socio-economic differentials, limited resources, 24 out of 81 low-income and lower-middle-income countries have met the MDG 4 which targets to reduce under-five mortality rate by two thirds and approximately 70 percent of all countries have at least halved their rates of child mortality.

All countries performed well for prevention of infectious diseases causing child mortality. However, the progress in cause-specific under-five mortality varied from country to country in 2015. Progress for pneumonia related deaths was not appreciable as compared to that of diarrhoea or other causes (Cha, 2016). Predominantly six conditions were found to be responsible for more than 70% of the under-5 mortality worldwide: "pneumonia (19%), diarrhoea (18%), malaria (8%), measles, (4%), HIV/AIDS (3%), and neonatal issues such as birth asphyxia, pre-term birth, and infections (37%)". HIV/AIDS is also becoming one of the prominent causes for infant deaths in Sub-Saharan Africa. Malnutrition also majorly accounts for the neonatal deaths (WHO, 2011).

Despite the diseases that have an impact on under-five mortality, Rademeyer (2017) argues that some Sub-Saharan African countries have achieved MDG 4 proposed by the United nations in 2000 which targets to reduce under-five mortality by two thirds. Countries including Uganda, United republic of Tanzania, and other lower and middle-income countries such as Bangladesh, Georgia, Indonesia and Egypt, have reduced their under-five mortality rates by two thirds or more (Rademeyer,2017). The estimates produced by the United Nations- Interagency group (2013) indicate that the highest rate of under-five mortality in 2012 was reported in Sierra Leone with an estimated 182 deaths per 1000 live births and the lowest under-five mortality rate were reported in Iceland region where there were fewer than 2.5 deaths per 1000 live births. This clearly shows that the level of under-five varies according to the status development of the country (Sohail,2017).

Rademeyer (2017) argues that children under the age of five years from the least developing countries were 25 times more likely to experience under-five mortality compared to those from developing countries. This was showed by the estimated rates of 153 deaths per 1000 live births from the developing countries and 6 deaths of children per 1000 live births from the most developed countries (Rademeyer, 2017). Despite the socio-economic disparities in other countries, it has been found that some developing countries such as Brazil have achieved Millennium Development Goal 4. Brazil is regarded as one of the world's poorer nations, yet it has succeeded in reducing under-five mortality by two thirds (Rademeyer, 2017). In addition, the country has achieved MDG 4 proposed by the United Nations and attained a decline from 61 per 1000 live births in 1990 to 16 per 1000 live births in 2015, which is a 73 percent reduction. This clearly suggests that regardless of the status of a country's development, with greater efforts, commitment and more determination, it is possible to achieve MDG 4.

Even though Sub-Saharan Africa is one of the regions which reported the highest under-five mortality rate in the world, with under-five mortality rate of 83 per 1000 live births in 2015 was recorded in the region, there has been a substantial improvement. It has been reported that the annual rate of reduction increased from 1.6 percent in 1990s to 4.1 percent in 2000–2015 in this region (Buwembo, 2010). Furthermore You *et al*., (2015) argues that even though a remarkable 3.1 % annual rate of reduction (ARR) was observed between 1990 and 2015 it was not enough to attain the MDG 4 target of 20 per 1000 live births.

According to Nannan *et al.,* (2012) it is of interest for South Africa to investigate the well-being of children. Although substantial progress has been made by the country, under-five mortality rates in South Africa remain higher than countries such as Brazil, China and Mexico which has similar economic development status (Rademeyer, 2017). Child mortality in South Africa is more characterised by large spatial differentials which are strongly associated with the level of socio-economic disparities. Each province clearly reflects broad economic differences in the development of the population. In the poorer provinces like Limpopo, Eastern Cape, Kwazulu-Natal and Mpumalanga, there are relatively low levels of infrastructure development such as (housing, water, sanitation and electricity), education and income, higher unemployment rates, and poor health care services (UNICEF, 2013; HSRC, 2014). Moreover, the report released by the Centre for Social Sciences research (2006) revealed that the poorer provinces had low coverage of immunisation and interventions such as prevention of mother to child transmission (PMTCT) were not effective (Rademeyer, 2017).

This was particularly striking as opposed to wealthier provinces such as the Western Cape and Gauteng provinces which are more developed and advanced. According to the Centre for social science (2006), Western Cape is regarded as one of the wealthiest provinces in South Africa. The province has a higher per capita income compared to other provinces, and it is the province which has managed to stem the number of deaths resulting from HIV /AIDS. Moreover, this was the first province that introduced HAART programme (Highly active antiretroviral therapy).

A study by Mohammad and Tabassum (2016) revealed that demographic and socio-economic factors such as age of mother's at birth of index children in years, maternal education, gender of child, region, place of residence, wealth index, birth order number, place of delivery, size of child at birth, exposure to media etc. may play important role in influencing under-five mortality rates. Rademeyer (2017) reported that there were about 5.2 million chil-

dren in 2010 that were under the age of five years in South Africa, representing 10.5 percent of all people in the country. Most of these children are black Africans living in in KwaZulu-Natal and Gauteng. The relative number of children aged under-five years to the total population in each province indicated higher proportions of children in KwaZulu-Natal, Eastern Cape and Limpopo (Rademeyer,2017).

The high rate of under-five mortality can be explained by the theory of epidemiological transition which was proposed by Omran. He proposed three stages of transition as underlying the changes in patterns of mortality and morbidity (Omran,1971). The first stage, which is 'the age of pestilence and famine', is characterised by high and fluctuating mortality due to epidemics, famines and war, and poor living conditions. In this stage, a combination of high crude death rate, high fertility rate, and low life expectancy at birth (between 20 and 40 years) results in slow population growth. According to Omran (1971), the most common causes of deaths are infectious and parasitic diseases, especially among children and women of childbearing age (15-49). Then the second stage, is 'the age of receding pandemics', witnesses declining mortality rates, initially high but later decreasing fertility, and life expectancy at birth increasing to around 55 years. Major driving forces in this stage of transition are sanitation improvements, control of major outbreaks of infectious diseases, and medical breakthroughs (including contraception). While infectious diseases remain as major causes of death, non-communicable diseases (NCDs) start to increase steadily (Omran,1971). Then the third stage is 'the age of degenerative and man-made disease, which is characterised by decreasing and relatively stable low mortality and increasing life expectancy at birth to over 70 years, manifesting in a population that is ageing.

2.1.2 *Objective 2*: To estimate the influence of socio-economic determinants of under-five mortality in South Africa

Mohammad & Tabassum (2016) found that socio-economic factors such as, maternal education, region, place of residence, place of delivery and size of child at birth may play important role in influencing the under-five mortality rates. Recent evidence that has been shown by Unger (2013) indicates that areas of broad economic and social disadvantage (due to overcrowding, substandard housing, poor water and sanitation) tend to have higher under-five mortality compared to socially and economically advantaged areas. This clearly suggests that socio-economic factors may play a big role in influencing under-five mortality as different regions in the country are more characterised with economic inequalities and differentials.

A study that systematically investigated the socio-economic inequalities in child mortality within and across African cities and their development over time by Wilm Quentin (2014) revealed that child mortality is considerably higher among the poor than the rich, with differences between the poorest quintile and the richest quintile being very wide. However, the above-mentioned study did not investigate the underlying reasons for the identified differences in inequalities across different regions of the world. It is this reason that the present research study explored the socio-economic determinants of child mortality using Mosley and Chen framework (1984). This study adopts this approach to estimate how socio-economic factors contribute to the under-five mortality in South Africa. It shows the pathways in which socio-economic and demographic factors operates and pose risks of infectious diseases which eventually lead to child mortality (Mosley, 1984).

Childhood mortality has been explained by various theories from different disciplines such as the social and economic explanation but theoretically Mosley & Chen have the most accepted theoretical framework when it comes to the explanation of under-five mortality (Mosley & Chen, 1984). This is the most accepted framework more especially in the developing parts of the world where there is a high rate of childhood mortalities. The main argument that has been brought forward by these scholars is that social and economic factors must operate through the sets of proximate determinants for them to have an impact on child mortality (Mosley and Chen 1984). The framework combines the methodologies of social and medical science and provides a better understanding and a clearer distinction between the causes of diseases and the causes of deaths.

Among the proximate determinants of child mortality related to the characteristics of the mother, researchers have focused on demographic factors such as age of mother at child's birth, parity, and preceding birth interval, and socio-economic factors including level of education, and employment status (Hobcraft, McDonald and Rutstein 1985). Studies have found that the risk of death of children is lower in the urban areas compared to the rural areas (Kabir, Islam, Ahmed *et al*., 2001; Kembo and Ginneken 2009). Similarly, Ettarh and Kimani (2014) findings in Kenya showed that rural poor mothers have a higher likelihood of experiencing child death than their urban counterparts. However, in a study by Kanmiki *et* al., (2017) there was no significant effect of place of residence on the mothers who experienced under-five deaths. Kanmiki *et* al., (2017) further argues that it may be more likely for the place of residence as some respondents might have changed between the times they experienced under-five mortality.

This is not a general expectation considering that the level of development that is more advanced for urban than for rural areas. However, some studies have found contradictory results, where children in rural areas have the lower risk of dying than their urban counterparts (Manda 1998). However, such findings are quite surprising, considering that urban counterparts are more associated with better socio-economic factors such as better infrastructure and better technological intervention that could accelerate the pace of reduction of under-five mortality and environmental factors that contribute to the reduction of child mortality. It has been apparent from the study conducted in Bangladesh that under-five mortality is significantly associated with the type of place of residence. Rates for child mortality were significantly higher for the rural mothers as compared to the ones who reside in urban areas. Children who were brought up in urban areas had 66% more chances of survival as compared to the ones in rural settings (Chowdhury, 2013). Buwembo (2010) agreed with these results that the level of under-five mortality rate in rural areas largely depends on socio-economic and the access to health services made available to the population at large.

In addition, the employment status of the mother can influence child survival in both directions. It may prevent her from giving adequate care such as breastfeeding to the child and hence, the child's survival is negatively affected (Hobcraft *et al.*,1985*).* It was discovered in India that greater child loss is more prevalent among working mothers than non-working mothers (Kishor and Parasuraman 1998). On the other hand, a working mother helps her family by increasing the household income, which may increase the likelihood of survival of the child. Similar results have been documented by Nair *et al.*, (2017) in a qualitative study where it was observed that the impact of maternal employment on nutritional and health status of child revealed that mothers working long hours affect the children's nutritional status and adequate care arrangements.

However, there are practices that are related to contraception, nutrition hygiene, preventative care & disease treatment. Similarly, Buwembo (2010) found that the educational level of the father usually correlates strongly with occupation and therefore also correlates with household income. In many situations, correlation between health effects and the educational level of the father or other non-childbearing economically productive adult members in a household largely occur because of operations on the proximate determinants through the income effects (Mosley and Chen, 1984). Evidence attributes increased under-five mortality rates to the impact of a wide range of biological as well as socio-economic factors mentioned above by Buwembo (2010) in sub-Saharan Africa.

Ogada (2014) also supports the argument that education is linked to family socio-economic situation, which is a determinant of child health. Moreover, maternal education may bring about certain changes in individual behaviour that result in better child health. Palloni (1981) argues that this is because educated mothers tend to live in more economically developed areas. Areas that are rich enough to have schools and medical facilities. Findings from the study conducted in Zimbabwe shows that parental, especially mothers' highest education level have high impact on under-five mortality as it decreases risk of under-five mortality among educated mothers. Similar results were obtained by Grepin *et al.,* (2015), where it was observed that highest educational level of the mother increases the reduction of child mortality as it helps the mothers to make better child health decisions and health seeking behaviour (Grepin *et al*., 2015). Similarly, Johri *et al*., (2015) argues that the education of the mother helps to increase the vaccination of the child. This clearly shows that educated mothers are well –informed of the modern health interventions and they adopt better ways of feeding practises as they know the risks of not taking care of their children.

An existing body of literature by scholars such as Caldwell and Caldwell (1993) suggests two potential pathways that education may reduce the possibility of infectious diseases. Education improves child health by enhancing the use of modern health services; and lastly education results in a wide range of favourable behaviour- mostly connected with child-care that play a role in improving child health. Several scholars such as Gune (2015) also found compulsory schooling as very essential as it helps to improve other maternal and child health outcomes. This argument has been confirmed by Greenway (2013) that a significant relationship between enhanced reading skills and child survival exist.

Ogada (2014 argues that evidence shows that the consequences for infant health and mortality are largely influenced by the general economic circumstances of the household. This has been supported by the Scholars such as Coavadia. *et al.,* (2009) where it was observed that the health of children in South Africa is more influenced by economic and social conditions under which they live and approximately 66 per cent of children in the country live in poverty. In poor families, a mother's occupation may result in child neglect or care by a less skilled caregiver at a community pre-school or less skilled sibling while a rich family may hire a skilled and attentive nurse. Moreover, mothers who have regular check-ups during the pre-natal phase tend to have successful deliveries and care of their children than those who lack the services in their local clinics.

2.1.3 *Objective 3*: To estimate the influence of demographic variables on under-five mortality in South Africa

According to Mosley and Chen (1984), all social and economic determinants of under-five mortality must operate through a common set of biological mechanisms or proximate determinants to directly influence the risk of mortality. This study adopts this approach to compare how demographic factors contribute to under-five mortality in South Africa. Mosley and Chen's framework pinpoints a set of proximate determinants that directly influence the risk of child and mortality. This framework emphasises that all social and economic determinants must operate through these variables in order to affect child survival (Ogada, 2014). The socio-economic determinants must operate through the proximate determinants in order to influence the level of growth flattering and mortality. At the individual level it has been found that the productivity of household member is determined by the skills which is usually measured by educational level, Mostly, for fathers particularly in cities educational level usually correlate strongly with occupation and therefore with household income. The framework adopted by Mosley and Chen (1984) in the present study uses demographic factors such as the age of the mother at first birth, sex of the child, birth interval and birth order to assess their predictive ability on under-five mortality.

A study by Rustein (2008) on the impact of birth interval on neonatal, infant and under-five mortality using 17 developing country's demographic health survey data, discovered a negative relationship between the risk of dying at neonatal, infant and child ages and the length of the birth interval. In the countries studied, neonatal and infant mortality respectively are about 55 and 58 per cent higher when the birth interval is between 18 and 23 months relative to when the interval is 36-47 months. The combined impact of birth order and birth interval on under-five mortality was also studied by some researchers such as Mustafa and Odimegwu (2008), and Kembo and Ginneken (2009). The identified correlation revealed by this study is that higher birth order children with short preceding birth intervals tend to have a lower chance of survival than children of lower birth order. However, infants are more affected by higher birth order with short preceding birth interval than children older than one year.

Short birth interval is considered as a determinant of child mortality because it makes mothers stop breast feeding at earlier time which has a significant contribution to a higher risk of mortality as this makes the child to be more vulnerable to diseases such kwashiorkor, measles, chicken pox and malnutrition diseases (Hobcraft, McDonald & Rutstein, 1985). In addi-

tion, the short birth interval may influence the next child since women who give birth within short preceding birth intervals may not have sufficient time to restore nutrients (Buwembo, 2010).

Also, sex of the child as the determining factor of under-five mortality has been studied by several researchers such as Boco (2015) who particularly observed from several countries of Sub-Saharan Africa that male children have significantly higher chances of mortality than girls before reaching the age of five years. Similarly, a study in Nigeria showed the highest risk of under-five mortality for males than females (Ezeh, 2015). However, for some other countries such as India this was not the case. Kuntla *et al*., (2014) found that in India females were more likely to die before the age of five than males. However, males were found to be biologically more vulnerable to mortality than females in virtually in all the age groups throughout life. According to Motsa (2014), boys have higher probabilities of childhood deaths both infant and child mortality. This has been documented by many scholars, indicating that child mortality by sex of the child varies from country to country.

Age of the mother has been found as the major concern for the risk of child mortality and morbidity (Ribeiro *et al.,* 2014). Pregnancy during the adolescent phase and older age (>45) are found to be more harmful for the child and the mother. The level of births in adolescent age have decreased worldwide since 1990 but still fertility in young age (11-19) contributes 11% of the births. 95% of these births from the adolescent phase occur in low and middle-income countries (WHO, 2014).

Several studies have reported contradictory results of birth order as the determining factor of under-five mortality. Kamal (2012) states that while some research studies have shown increased risk of neonatal mortality among higher-ranked births, others have found that the risk increased for the first or lower-ranked births. Mekonnen, (2011) reported that the risk of childhood mortality is higher among first birth order born by very young mothers. It steadily declines with subsequent birth orders and mother's age and then starts increasing again (Mekonnen, 2011).

A study conducted by Motsa (2014) regarding the birth interval observed a positive correlation between birth interval and its predictive ability to cause under-five mortality rate. This was confirmed by scholars such as Mustafa and Odimegwu (2008) where it was found that there is a high risk of childhood deaths for short birth intervals, whereas long birth intervals are related to reduced risk of infancy and childhood deaths. According to Buwembo (2010),

this is because the mother has not restored all the nutrients that the baby needs in order to grow and the competition between the siblings may play a huge role as the mother will not have enough time to nurture and bond with her new-born. Moreover, Stephenson (2002) revealed that competition for resources between the new-born and the previous sibling may be the pathway through which short birth intervals increases the likelihood of mortality risk among the children.

2.2 Empirical literature review

2.2.1 *Objective 1*: To compare the levels of under-five mortality in South Africa across the provinces

According to a report by UNICEF (2015), there has been a global improvement in eradicating under-five mortality in the past 25 years. Under-five mortality rate declined from 53 percent to 56 percent from 91 (89,92) deaths per 1000 live births in 1990 to 43 (41, 46) in 2014 (UNICEF,2015). In addition, over the same period the annual number of under-five deaths dropped from 12, 7 million to 5, 9 million. At the country level, it has been found that about a third of62 countries have successfully reduced their under-five mortality by two thirds or more and achieved the MDG 4 target set in 2000 (Buwembo,2010).

Despite these improvements, Buwembo (2010) mentions that it has been reported that Sub-Saharan countries such as South Africa have the least reductions of under-five mortality compared to other regions. Results revealed marked geographical differences in infant mortality risk between provinces, as well as significantly higher risk in specific sub-districts and provinces. Several determinants were found to have a significant adverse influence on infant mortality at the sub-district level. Following multivariable adjustment increasing maternal mortality, antenatal HIV prevalence, previous sibling mortality and male infant gender remained significantly associated with increased infant mortality risk.

According to a United Nations report on child deaths, child mortality in South Africa has declined from 61 deaths per 1000 live births in 1990 to 45 deaths per 1000 live births in 2012 (IGME, 2013). The performance of the country in this regard is however found to be very low compared to many other countries' performance. For instance, the world has made substantial progress in reducing the under-five mortality rate by 47 per cent in the period 1990-2012, while South Africa has attained a reduction of only about 26 percent, which makes the country very unlikely to achieve the MDG 4 which aims to have infant and under-five mortality rates reduced to up to 18 per 1000 births respectively by 2015 (Stats SA 2013).

Although HIV/AIDS has been reported as the main reason for this low performance, the role of poverty and inequality should not be ignored. It has been reported that the health of infants and children in South Africa is largely influenced by social and economic conditions and approximately 66 percent of children in the country live in poverty which also result in malnutrition (Buwembo,2010). A study using Nigeria Demographic and Health Survey for 2008, found that relatively prosperous households were less likely to experience child death than the poorest households in rural Nigeria (Kanmiki, Bawah, Agorinya & Williams, 2014). Existing literature has revealed mixed results, such as place of delivery, birth order and sex of the child. For instance, empirical evidence suggests that women who deliver at health facilities have a lower chance of child death as compared to those who deliver at home due to the use of skilled delivery at health facilities and the none existence of such at home. However, studies in South Africa and parts of Nigeria suggest that place of delivery does not have significant effect on either perinatal or under-five mortality (Kanmiki *et al.*,2014).

Although South Africa has made a progress in achieving MDG 4, its child mortality and morbidity rates are still higher than the other countries with similar economic status such as Tanzania, Brazil, Mexico and China as well as number of other developing countries (Zewdie,2014). South Africa's child mortality rate is not very far from countries such as Botswana, Rwanda and India. Based on the estimates of child mortality developed by United Nations (2013), South Africa's under- five mortality rates from 1990-2012 fell from 61 to 45 deaths per 1000 live births. However, the decline has not been consistent as in many other countries or the world-wide pattern. Researchers have revealed that due to the widespread of HIV endemic there had been a reversal of child mortality beginning from mid-1990 and lasting to 2005. It started to decline at a higher rate due to the introduction of the initiatives such as PMTCT (prevention of mother-to child transmission) programme and Anti-retroviral treatment (Rademeyer,2017)

Based on Stats SA estimates, under-five mortality between 1998 and 2007 increased from 59 to 67 deaths per 1000 births before it declined to reach a level of 53 deaths per 1000 births in 2010 (Stats SA, 2013). Child mortality in South Africa is characterised by large spatial differentials which are strongly associated with the level of socio-economic disparities. Geographically, South Africa is divided into nine different provinces: Western Cape (WC), Eastern Cape (EC), Northern Cape (NC), Free State (FS), Gauteng (GT), North-West (NW), KwaZulu-Natal (KZN), Mpumalanga (MP) and Limpopo (LP). Each of these provinces reflect broad differences in geography, environment, population, and status of development.

In poorer provinces like Limpopo province, Eastern Cape, and Kwazulu-Natal, there are relatively low levels of infrastructure development (housing, water, sanitation, electricity, etc.), education and income, higher unemployment rates, and poor health care services (UNICEF 2013; HSRC 2014). It has been noted that child mortality rates in the country tend to be much higher in certain disadvantaged provinces and social groups, more especially in rural areas such as KwaZulu-Natal and Eastern Cape. These geographical differences also play a huge role in influencing under-five mortality. In addition, it has been found that some provinces are more characterised by low employment rate which may cause poverty and lead to high rate of malnutrition (Zewdie, 2014).

Contrary to the above statement there are also richer provinces that may be less affected by under-five mortality, in richer provinces like WC and GT there are better infrastructure development, higher income and education levels. Child mortality rates in the poorer provinces are usually estimated to be very high compared to the richer provinces. Research conducted by Dorrington, *et al*., (2004) reports provincial estimated trends of under-five Mortality rates from 1986 to 1996 using the 1996 census. Over the period considered, the lowest mortalities were reported in WC and the highest mortality rates were reported in the Eastern Cape Province respectively. According to Zewdie (2014), the estimate for boys per 1000 live births varied from 44 in WC to 114 in EC in 1986, while in 1996 it varied from 47 in WC to 102 in EC. Similarly, the estimates for girls, respectively for WC and EC, were 30 and 107 in 1986, and 32 and 87 in 1996. These variations clearly indicate socio-economic disparities and inequalities that exist in the above-mentioned provinces.

In their review on levels and causes of child mortality in South Africa in the period 1997-2007, Dorrington, Laubscher *et al*., (2012) revealed the trends of provincial estimates of infant mortality rates over the period. It is indicated that in each of the provinces, infant mortality was mostly increasing and, in some provinces, such as FS, NW, MP and GT, the rate was much higher (above 50 deaths per 1000 live births). Substantial socio-economic disparities lie behind the challenges faced by children in South Africa where there is huge gap between rich and poor and child poverty is far higher than that of the general population (UNICEF 2013).

The National Planning Commission estimated that 39% of people in South Africa live below the R432 per person per month poverty line (National Planning Commission,2011), while approximately 66% of children in the country live in poverty, with a monthly household income of less than R1200 per month (Whiting 2013). Moreover, according to the report by

UNICEF, the percentages of children living in poverty using R575 per month as poverty line were 73, 64 and 60 respectively in 2003, 2008 and 2010 (UNICEF 2013). This report also revealed provincial poverty levels as: LP (80.1%), EC (77.5%), KZN (73.1%), MP (71.5%), FS (69.4%), NW (68%), NC (67.3%), WC (38.7%), and GT (38%), showing how big is the poverty differentials among provinces. In a recent report by the Human Science Research Council (HSRC 2014), it is indicated that currently the poorest provinces are LP, EC and KZN, and hence they have higher levels of poverty compared to other provinces. Raji (2010) argues that the disparities within these provinces were due to the historical apartheid. Those were the policies which have made certain segments of South African society to have easier access to better conditions of living, such as, good health care facilities, water, and housing. In addition, crimes that are specifically targeted at children which sometimes result in deaths are prevalent in these disadvantaged communities.

It is evident from the above trends that under-five mortality in South Africa varies according to geographical areas. Some provinces experience higher childhood mortality due to the socio-economic differences in terms of access to medical facilities. For instance, urban areas in the Western Cape and Gauteng provinces experience lower rates of under-five mortality because there is better access to medical resources compared to the rural areas in provinces such Limpopo province, Kwazulu-Natal and Eastern cape.

2.2.2 *Objective 2*: To estimate the impact of socio-economic variables on under-five mortality in South Africa

Ogada (2014) found that the survival of the child in the first 4-5 years depends on several socio-economic, biological, environmental & cultural factors. Moreover, Caldwell (1979) reveals a strong relationship between variables such as maternal education, mother's place of residence and expenditure on health and infant and child mortality. Ogada (2014) further argues that child mortality is mainly caused by childhood diseases and accidents whether children become ill depends on their nutritional level, the environment and their mother's preventive health care behaviour. When children become ill the chances of their survival depends more on the knowledge and behaviour of the adults who takes care of them.

Extensive demographic research on child health focuses on maternal education as an antecedent to improved child health. This hypothesis has been supported by several scholars such as (Hobcraft, *et al*., 1985,). Palloni (1981) also revealed that literacy has a much greater influence on child mortality than on infant mortality. Caldwell (1979) further reveals that educated women adapt better advanced behaviours and they can stand up to the mother in law's au-

thority more than uneducated women can and can help them to acquire modern medical services and to practice new and more hygienic forms of child care.

Maternal education has been referred to as one major social determinant of under-five mortality and was reported to vary at different levels of mother's education. Though, other socio-economic factors influence childhood mortality, the effect of maternal education had been proven as the strongest (Caldwell, 1979). In addition, Caldwell (1979) carried out a study on the effects of mother's education on child mortality and argued that an educated mother is more capable of manipulating and understanding the modern world compared to the uneducated one. Furthermore, her opinion is more likely to be valued and listened to by doctors and nurses because of her ability to communicate on issues relating to the health of the child. Studies have shown that other factors may play a huge role to negate the influence of mother's education on under-five mortality for instance education on under-five mortality may be influenced by different factors.

Oni (1988) found that the type of residence may also play a huge role on under-five mortality, he found that an educated mother who still lives in a traditional setting with her in-laws for instance with her mother-in law may lose her decision-making power to those in-laws on the care of the children. Educated mothers are more likely to report health complications of their children at an early stage when the symptoms appear, since they have better knowledge and well informed about the diseases and outbreaks, hygiene, nutrition and childcare practices, compared to their counterparts who may not have access to such information (Buwembo, 2010). Education could influence the choices of a mother and empowers her to make the right decision in terms of nutrition, preventative measures and disease treatment for her child.

In addition, other studies suggest that father's educational attainment strongly relates with his occupation which may affect household income (Buwembo, 2010). Studies have shown that a strong correlation exists between educational attainment and lower mortality rates (Fayehun & Omololu, 2009). It was revealed in the Nigerian Demographic and Health Survey Report of 2013, that children born by mothers who had no education reported highest under-five mortality rates of (180 deaths per 1,000 live births), compared to their counterparts who had more than secondary education and who reported 62 deaths per 1,000 live births (Kayode *et al*.,2012). This is because, educated mothers are more likely than illiterate mothers to ensure a healthy environment, nutritious food, and have better knowledge about reproductive health at conception and health care facilities for their children (Kuate-Defo, 1993, Buwembo,

2010). Consequently, educated mothers are more likely to give birth to healthier babies because they themselves tend to be healthier and are likely to experience lower mortality among their children at all ages (Uddin *et al.*, 2009).

Empirical evidence has shown that higher levels of education are associated with specific types of health knowledge, including awareness of the dangers of not boiling water, the importance of hand washing after latrine use, the proper use of oral rehydration therapy to treat diarrhoea, and an understanding of toxins that may also causes diseases (Frost *et* al.,2014). The relationship between child mortality and socio-economic factors has been studied by many Scholars such as (Buwembo 2010; Hobcraft 1985; Sastry 2004, Rademeyer 2017; Motsa 2014; Mustafa and Odimegwu 2008).

The socio-economic factors considered in this present study, adopted from Mosley and Chen (1984) framework, are mother's level of education, place of residence, region, employment status of the mother. According to Mosley & Chen (1984), mother's education is the most socio-economic variable affecting child survival. It may affect child survival by influencing her choices and improving skills on contraceptive methods she chooses and other health care practices that she may adopt on the duration of her pregnancy. This relationship has gained the attention of many researchers. An increased chance of survival can even be associated with a small increase in amount of education of mothers (Hobcraft 1993). Cleland (1990) indicates that the improvement of child survival due to mother's education is because of the modest effect of education on health knowledge and beliefs. An educated mother may be able to adopt modernised medical techniques compared to an illiterate mother who may have insufficient knowledge of medical techniques.

Place of residence has also been found as another factor which influences the high rate of childhood mortality globally. Children living close to health care facilities experience lesser risk of deaths compared to their counterparts who lived some distance away from the health resources (Tette and Owusu, 2014). This can be said to be a typical experience of households in the rural areas of most developing countries. In addition, it has been found that urban areas usually have better infrastructures for health care facilities and are built close to the residential areas. Rural-urban residences have been found to be another strong determinant of child's well-being (Mutunga, 2004). It was found that the probability of mortality among under-five children was higher in rural areas compared with urban areas (Ettarh and Kimani, 2011). However, a study by Susuman & Hamisi (2012) conducted in Tanzania found contradicting

results. It was documented that under-five mortality was more prevalent in the urban areas compared to the rural areas and this was attributed to the high prevalence of HIV and AIDS and malaria incidence in most of urban areas in the country.

Fayehun & Omololulu (2009) argues that in Nigeria the south-western zone reported greater developments in child survival than the northern zones. Mothers who live in well- developed communities reduced the odds of neonatal deaths and eventually, under-five deaths. Hence, community infrastructures may improve hygienic practices. Also, as mothers interact within themselves in the same neighbourhood, they learn from one another which may lead to changes in behaviour regarding the care of their children and in this case better off communities may benefit from the overall level of community education (Buwembo, 2010). Some characteristic present in the neighbourhood where children are raised might be more likely to influence the mortality risks of such children (Antai, 2011; Adedini, 2013). For example, children raised in economically and socially deprived communities might be more exposed to the risk of under-five mortality compared to those in developed communities (Adedini, 2013).

Parental occupation also determines the under-five mortality, it has been found that parental occupation determine the wealth status of the house and this may affect the amount and the quality of food intake the children are entitled to consume, the type of shelter and access to health care services available for children living in the household (Ahonsi, 1992). A study conducted in India, revealed that mother's working status has a negative influence on child survival. For instance, if the mother's work is far from home where the child resides, the absence of the mother rather than the employment status is what may affect the child's health. If the mother's occupation activities are around the home the outcomes might be different.

Nutritional status has been reported as one of the strong determinants of under-five mortality in most developing countries in the Sub-Saharan Africa. Motsa (2014) found that nutritional status of children has a strong influence on health. Hence, the children who suffer from malnutrition are more likely to be more vulnerable to disease that may lead to under-five mortality. Moreover, malnutrition may result in the breakdown of essential minerals that may prevent the body of a child to develop fully by preventing the body to assimilate the needed nutrients. Black (2008) reported that under-nutrition has contributed to more than 3, 5 million deaths. Black (2008) further argues that if malnutrition continues into the second year of the children they might suffer from irreversible physical and cognitive damage that may have

negative impact on their future health and social well-being and this may result in low birth weight, stunting and other deficiencies.

Antai (2010) have discovered a correlation between under-five mortality and wealth status. It has been found that the absence or shortage supply of assets in a household or resources that makes life comfortable may negatively affect the child's health. Low birth weight, high neonatal mortality and chronic diseases are the consequences of poor socio-economic status. Wealth status of a household is an important predictor of mortality of all age groups not specific to under-five mortality, but the associations are weak at younger ages.

Empirical evidence by Buwembo (2010) attributed the highest rate of under-five mortality to the impact of a wide range of socio-economic factors such as mother's education, type of place of residence, region and mother's occupational status. These were found to have more influence on under-five mortality.

2.2.3 *Objective 3*: To estimate the impact of demographic variables on under-five mortality in South Africa

Mosley & Chen (1984) mentioned demographic determinants of under-five mortality which influence the child survival. Studies conducted by scholars such as Hobcraft *et al.*, (1985), Rustein (2000) and Davanzo *et al.*, (2004) indicate the association of these factors to child survival.

According to Buwembo (2010), high mortality and morbidity has been associated with the first born and with high birth order. Hobcraft *et al.*, (1985) showed a clear excess of neonatal mortality for the first birth and first birth children continued to be at a disadvantage during the remainder of infancy. This could suggest that mortality associated with births of high orders may be predominantly caused by other factors like birth intervals. However, it should be noted that the outcome of the first birth could be associated with the age of mother rather than the order. Hobcraft (1993) states that delaying the first birth until a woman is at least 18 years of age might reduce the risk of death for first born children by up to 20 per cent on average and up to 30 per cent in a few countries. Furthermore birth order may also play a role in the probability of infant and child mortality, though the direction of the effect is more ambiguous.

According to the hypothesis of intrahousehold resource competition, first-born children are more likely to be given all the vital resources such as food and care, thereby reducing their mortality risk (Ogada,2014). On the other hand, it has been found that first born children,

who are more likely to be born to mothers at younger reproduction ages, experience a higher mortality risk than children of a higher birth order. Birth interval is another key determinant of childhood mortality and it influences it through breastfeeding, survival status of the preceding child, multiple pregnancy etc., (Kayode *et al*., 2012). Birth spacing of at least 36 months helps to reduce deaths of children.

Other researchers like Mohamed, *et al*., (1998) linked the death of the first born to low birth weight. Buwembo (2010) also found that increased mortality risks among children born after short birth intervals. Several studies have investigated possible pathways through which preceding birth intervals may affect childhood survival. Boerma and Bicego (1992) provided possible pathways through which the relationship between preceding birth intervals and child survival might be affected, identifying prenatal and postnatal mechanisms. According to Buwembo (2010), postnatal mechanisms include poor nutrition of the mother, which may lead to impaired lactation and the inability to provide adequate care for the children. Sibling competition may also influence the mortality and morbidity of the child. It has been discovered that the closer the siblings are in age the more likely they will demand the same parental care. Competition for some resources like breast milk could be very shorter due to the short birth intervals (Buwembo, 2010). The results of Boerma and Bicego's (1992) study suggest that prenatal factors are more significant than postnatal factors. Hobcraft, *et al.*, (1985) concludes by arguing that short child spacing could be the dominant source of most of the apparent increase in risks at high birth orders and higher ages of the mother. Children born at very short intervals after preceding births (1 to 17 months) are about twice as likely to die as those born after intervals of 24 to 47 months: those born after 18-23 months experience an excess risk of about one-third (Hobcraft,1991).

Several researchers such as Boerma & Bicego (1992) also revealed mortality risks among children who are born after short birth intervals. Their studies provide other possible ways through which the relationship between preceding birth intervals & child survival might be affected by identifying prenatal & postnatal mechanisms. According to Buwembo (2010), it is believed that women with a short birth interval between two pregnancies have insufficient time to restore their nutritional reserves which might affect the foetal growth. Shorter birth intervals have been recognised as having potentially serious implications for the health of both children and their mothers. Boerma & Bicego (1992) also revealed high risk of intrauterine growth retardation for shorter inter-pregnancy intervals. Both intrauterine growth retardation and prematurity lead to low birth weight which is a strong determinant of infant mortali-

ty. According to Buwembo (2010), it has been evident that children following very short intervals have higher rates of neonatal, post-neonatal and childhood mortality than those children who are following longer intervals.

Moreover, the age of the mother at birth is more significant in determining the survival of the child. Several studies conducted by researchers such as Hobcraft et al (1985), Rustein (2000), Motsa (2014), Machado & Hill (2005) have shown the association between the age of the mother at birth and the child survival. Others have shown that there is a strong association between maternal age and child survival. However, this association may be determined by other factors such as sanitation, immunization, breastfeeding and previous child deaths (Hobcraft *et al.*, 1985; Kayode *et al.*, 2012). In a study conducted by Buwembo (2010), under-five mortality was higher for teenage mothers compared to mothers who were well matured before having their first birth (above age 20 years). This is because, mothers who are well matured (age 20 and above) before having their first child would have sufficient knowledge about child care either formally or informally (Buwembo, 2010).

Marital status of the parents can also play a huge role in determining the survival of the child. Countries that continue to experience high child mortality rates are also those countries that are more characterised with high fertility rates and early marriage (Buwembo,2010). Early child marriage may refer to any form of marriage that may take place before the child reaches the 16th birthday. Although the early marriage practice is still not approved it is still prevalent in some developing countries such as South Africa, particularly in poorer rural areas. In most developing countries, marriage signals the beginning of reproductive life hence early marriage is associated with early child-bearing and higher fertility, both of which are more detrimental to child survival. Early marriage also limits female schooling opportunities whereby young girls are taken out of school in order to take care of domestic, marital and maternal duties.

Gender or sex of the child has been found to be more significant in determining the survival of the child. Zewdie (2014) found that infant and child mortality varies by the sex of the child in developing countries. This has been evident in a study conducted by Mustafa and Odimegwu (2008). The probability of male children dying before the age of five years is higher than that of female children. This is particularly common in societies in which there is less gender discrimination, like South Africa (Zewdie,2014).

2.3 Summary of reviewed literature

2.3.1 Objective 1: To compare the levels of under-five mortality across the provinces from 2000-2015

This section shows similar, salient, and different points that emerged from the literature review. These concepts include the absence of vital registration which makes it difficult for many scholars to produce under-five mortality estimates in South Africa.

Salient points

The world has made significant progress in eradicating under-five mortality in the past 25 years. The report by the UN Inter-agency Group (2015) revealed that globally under-five mortality rate dropped from 53 percent to 56 percent from 91 (89, 92) deaths per 1000 live births in 1990 to 43 (41, 46) in 2014. Over the same period the annual number of under-five deaths dropped from 12, 7 million to 5, 9 million. At the country level, it has been found that about a third of countries (62) have successfully reduced their under-five mortality by two-thirds or more and achieved the MDG 4 target set in 2000. Despite these observed improvements and gains, it has been reported that Sub-Saharan countries such as South Africa have the least reductions of under-five mortality (Buwembo, 2010). A report by the United Nations showed a distinctive decline in child mortality within South Africa from 61 deaths per 1000 live births in 1990 to 45 deaths per 1000 live births in 2012 (IGME, 2013). However, despite these gains, the progress and performance of the country was still very low compared to other developing countries. Globally, noticeable improvement was observed. The world has made substantial progress in reducing the under-five mortality rate by 47 per cent in the period 1990-2012. Yet South Africa only attained the reduction of approximately 26%, hence MDG 4 remained unattainable in 2015 (Statistics South Africa,2013).

The absence of complete vital registration within South Africa has meant that national child mortality estimates must be estimated using census and survey data. This can be accomplished through the utilisation of indirect and direct techniques. This is apparent in the present study, as under-five mortality rates were computed using a direct estimate method. Obtaining mortality data is one of the most controversial issues that many researchers still debate. Scholars such as Darikwa (2009), Udjo (2014) & Nannan *et al*.,(2012) revealed that the vital registration system is the most inconsistent system that makes it difficult for under-five estimates to be produced.

In many developing countries, vital registration as well as the recording of the population by age in childhood is often incomplete and subject to error. A further problem with vital registration systems is the frequent delay in compilation and publication. Many studies have indicated that differentials in geographic distribution of health resources among the provinces is the driving force behind the unequal rates of under-five mortality. Results showed marked geographical differences in infant mortality risk between provinces as well as significantly higher risk in specific sub-districts and provinces. Several determinants were found to have a significant adverse influence on infant mortality at the sub-district level, some provinces experience higher under-five mortality rates especially rural provinces due to the lack of health facilities (Rademeyer,2017). However, this is not the case in the urban areas.

South Africa has been experiencing high under-five deaths over the years and this has been revealed by the figures that were obtained by other several scholars such as Udjo (2014), Nannan *et al*,(2012). For instance, Nannan *et al.*,(2012) revealed that the provincial disparities in under-five mortality rates in South Africa from the 2007 Community Survey indicated that each province was way above the international set target for the country. Limpopo had the highest recorded under-five mortality within the province of 110 per 1000 live births. Trending very closely to this estimate was the Eastern Cape, Kwazulu-Natal, and North West at 105 per 1000 live births.

Similarities

Recent literature on the phenomenon of under-five mortality indicate that the lack of vital statistics makes it difficult for researchers to make under-five mortality estimates. Various scholars including Rademeyer (2017), Nannan *et al*.,(2012), Dorrington *et al*., (2009)and Udjo (2014) have argued that in many developing countries, vital registration as well as the recording of the population by age in childhood is often incomplete and subject to error. In addition, due to vital registration system delays, the compilation and publication of data for under-five mortality estimates are produced using national surveys and census. Rademeyer (2017) is not the only researcher who identified the lack of vital statistics as controversial in South Africa in relation to producing under-five mortality estimates. Kamangira (2014) also argued that mortality estimates would be derived from vital registration statistics. However, in sub-Saharan-Africa, these data are characterised by incompleteness such that mortality measurement become dependent on population censuses and national surveys (Bradshaw *et al*., 2012). Furthermore reliability of South African vital registration and census data was

problematic due to data quality issues and completeness of death registration, particularly in children. Appropriate policies and strategies are constrained by a lack of reliable child mortality data and statistics, particularly in the least developed countries that evidently have the highest levels of child mortality (Garrib *et al*., 2006). Moreover, according to Garrib *et al*., (2006), less than 10% of Africa is covered by death registration systems.

Differences

It is evident from the literature reviewed in respect of objective 1 that Sub-Saharan African countries and regions experience different estimates of under-five mortality. It was noted that child mortality varies according to the development status of the country. For instance, Rademeyer (2017) highlighted the substantial progress totalling up to 60 percent of reduction whereas the least developed countries were behind with 53 percent decline. These clearly suggest that the level of mortality has been found to be highly associated with the development status of a country.

Conclusion

Several gaps were identified while reviewing the related literature for objective 1. It has been noted that South Africa lacks mortality data which makes it difficult for researchers to produce under-five mortality estimates. According to Statistics South Africa (2006), collection of mortality data in South Africa is a challenge that the country grapples with as the vital registration system for South Africans did not exist under the apartheid government. Hence the focus of objective 1 is to compare the levels of under-five mortality across the provinces from the period of 2000-2015. A comparative trend analysis of under-five mortality was conducted across the provinces and within provinces for the period above-mentioned period. This was done in order to compare the disparities in provincial departments of health across the provinces; it will inform government and policy makers what is needed in different provinces in order to accelerate the pace of reducing under-five mortality in the provinces in order to meet the SDGS that were set for 2030.

This study seeks to fill the mortality gap estimates that are needed in South African provinces by exploring provincial differentials of child mortality within South Africa and how the levels of mortality rates varies between the provinces due to different social factors and determinants that influence high levels of under-five mortality across the provinces.

Evaluation of the literature

Scholars such as Udjo (2014), Nannan *et al*., (2012), and Garrib *et al*., (2006) have argued that the lack of vital registration systems make it difficult to produce the under-five mortality estimates. It is evident from the literature that developing countries in Sub-Saharan African have the worst vital registration systems. It has been evident that developing countries experience major problems with regards to vital registration. Due to limited data and poor data quality, under-five mortality rates are estimated using the national surveys and census data. It is clear from the literature reviewed in respect of objective 1 that Sub-Saharan and Asian countries experience the most alarming under-five mortality rates and most of the countries in these regions are making strides towards MDG 4 due to reversal of child mortality. Notably the reversal is attributed to PMTCT and Anti-retroviral drugs introduced to slow the pace of under-five mortality.

2.3.2 Summary of reviewed literature for objective 2

Objective 2: To estimate the impact of socio-economic variables on under-five mortality in South Africa.

Salient points

Apart from the insufficient accuracy in data collection, analysis and interventions, other concepts emerged while reviewing the literature for objective 2. These are socio-economic and health-related determinants of child mortality. Many factors were identified as the predictors of under-five deaths such as type of place of residence, region, maternal education and mother's occupational status.

The above factors have been found to increase the likelihood of under-five mortality even though they may be preventable. Unfortunately, the situation is still unmanageable, especially in developing countries. This is due to obstacles that are more prevalent at the infrastructure level or at the community level. Access to healthcare services are still currently limited due to unequal distribution of facilities, weak primary healthcare set-up, poor quality of services, non-existing referral services, logistics barriers, overburdened healthcare facilities (IGME, 2015; Shrivastava *et al*., 2013) paucity of healthcare professionals, and a negative attitude of health workers towards the community (Thompson and Keeling, 2012).

Similarities

According to the literature it is evident that under-five mortality varies according to the region and type of place of residence. It has been indicated in the literature that numerous factors influence under-five mortality. These include socio-economic factors such as mother's

employment status, maternal education and type of place of residence. These are all referred to as under-lying factors as they exert indirect influence on under-five mortality. In addition, direct factors mainly demographic factors include mother's age, sex of the child, birth interval and birth order, these are referred to as proximate determinants of under-five mortality as they have a direct impact on under-five mortality. Scholars such as Buwembo (2010) & Motsa (2014) have found that there is a correlation between socio-economic factors and under-five mortality, and it is noted that people who reside in rural areas experience more health disparities as they are in shortage of health resources which may have adverse consequences on the health of mothers. Ultimately these may influence their unborn or new-born.

Differences

Rademeyer (2017) found a significant association between the mother's education and under-five mortality. It has been found that education plays a vital role in many arenas of life. This is reinforced by the notion that indicates that the more educated the woman is the more likely she is to adopt preventative and life-saving measures. This is strengthened acquired knowledge and exposure to educative measures. Also, more educated people are more likely to adopt new medical technologies and purchase better medication (Lleras and Lichtenburg, 2002).

While the vast of the literature showed different pathways in which mother's educational level can have an impact on under-five mortality in Sub-Saharan Africa. On the contrary Magadi (1997) suggest that father's educational attainment is more associated with child health in Kenya where the status of the women is regarded as very low. Mosley & Chen (1984) were also in agreement with Magadi's (1997) argument where they argued that father's education may influence attitudes and preference in choice of consumption goods. They pointed out that this influence is more likely to be most significant for child survival when a more educated father is married to a less educated mother. On the contrary, Buwembo (2010) found higher associations between the maternal age and Under-five mortality rather than maternal education.

Buwembo (2010) further asserts that in most developing countries, the mother's type of place of residence influences children's survival and nutritional status. Similarly, a study conducted in Uganda by Bbaale (2011) found an association between rural residents and lower child survival rate compared to their urban counterparts. This relationship has been demonstrated by researchers such as Zhang and Kanbur (2005) In a study that explored infant mortality in

relation to social inequalities in the provision of health care between rural and urban areas in China found wide gaps in infant mortality rate between rural and urban residents as well as among different provinces or regions (Zhang and Kanbur, 2005).

Evidence by Antai (2011) and Aremu *et al*., (2011) suggest that residing in a socially and poor community or neighbourhood increases the likelihood of under-five mortality. In addition, it has been found that children who are born and raised in a community that lacks electricity and good drinking water are more likely to die before they reach their fifth birthday, These can directly and indirectly influence their health outcomes and cause possibilities of risk of infectious disease which may eventually lead to death. Griffits *et al.,* (2004) contrast this argument by stating that community characteristics such as place of residence are not important as compared to the family correlation. This is because the family of the child is supposed to nurture and create a bond with the new-born.

Conclusion and gaps

While reviewing the literature of objective 2 several gaps were noted in the area of under-five mortality some of the gaps were filled by the present study, these include the role that socio-economic factors play in fluctuating under-five mortality. From the above presented literature, it has been apparent that many under-five deaths are attributed to socio-economic variations in the provinces. There is no doubt that South Africa still operates under the laws and policies that were formulated under the apartheid government this has been indicated by the inequalities among the provinces. Some provinces such as the Western Cape and Gauteng experience lower under-five deaths due to the status of the province whereas in Some provinces there is more prevalence of under-five mortalities. These deaths are due to the lack of proper health care in the rural provinces such as Limpopo, Eastern Cape and lastly Kwazulu-Natal. This study aims to showcase how these socio-economic factors such as type of residence, region, mother's occupational status, and mother's education may contribute to the high level of under-five mortality and how these inequalities may have an influence on the deaths of children younger than the age of five.

Evaluation of the literature

The literature presented for objective 2 presents the pathways of how socio-economic variables such as type of place of residence, region, maternal education and mother's occupational status operate through demographic variables such as the mother's age, sex of the child, birth

interval and birth order or influence one another to cause infectious disease. It has been apparent from the literature that some regions experience high under-five mortality rate due to socio-economic variations and the development status of the provinces. Scholars such as Motsa (2014) have found a significant association between maternal education and under-five mortality, however contrary to that, Buwembo (2010) established a relationship between maternal education and under-five mortality. In his study, he found that mother's age at first birth is highly correlated with the child survival. A study conducted by Buwembo (2010) in South Africa showed a high rate of under-five mortality among the mothers who are between the ages of 15-18. It has been evident from the literature reviewed for objective 2 that socio-economic disparities that are experienced in poorer provinces have more impact in influencing child survival in the country.

2.3.3 Summary of reviewed literature for objective 3

Objective 3: To estimate the impact of demographic variables on under-five mortality in South Africa

While reviewing the related literature for objective 3, other concepts emerged. These include an on-going debate between the scholars that age has more significant effect on under-five mortality than other factors such as maternal education. However, some scholars found that maternal education plays an important role in predicting under-five mortality.

Salient Points

Studies conducted by Sewanyana and Unger (2007), as well as Buwembo (2010) and Rademeyer (2017) have revealed that the age of the mother is the most important contributing factor of under-five mortality. Specifically, a study conducted in Uganda by Sewanyana & Unger (2007) revealed that children who were born by older women had the highest probability of dying before the age of five years compared to those who were born by mothers between the age group of 20-30.

Similarities

Several scholars such as Buwembo (2010), Rademeyer (2017) and Motsa (2014) have noted that different correlation exists between under-five mortality and variables such as age and maternal education. However, there has been an on-going debate among scholars about the relationship that exist between under-five mortality and age. Some Scholars have found noted correlations between the under-five mortality and maternal education.

Motsa (2014) revealed that age of the mother is one of the important causal factors of infant and child mortality. A study done in Uganda by Ssewanyana and Younger (2007) revealed a lower likelihood of mortality among infants born to older women compared to infants born to younger women. Apart from exhibiting a 50-100% risk of death in less than a month after birth, children born to younger mothers, in particular adolescents, are likely to experience pre-term birth, low birth weight and asphyxia which potentially upsurge the risk of death and development of unfavourable future health conditions for the children than children born to older women (WHO,2006). However, despite the steady decline in the risk of infant and child mortality with age, it tends to also increase again with age. According to Sullivan (1994), older females who have had repeated births are more likely to experience pregnancy complications due to the deterioration of the reproductive system. Similarly, Charmabagwala *et al.*, (2004) found that older mothers were likely to experience child death than young mothers. Consequently, the evidence underscores the fact that both young and old women can be expected to have high risk of infant and child mortality than women in the middle of the reproductive years.

Differences

While reviewing the related literature for objective 3, it was evident that some demographic variables were more associated with under-five mortality. A significant relationship was found by Motsa (2014) and Rademeyer (2017) between the maternal education and child survival. They both discovered that maternal education reduces the odds of under-five mortality, however Buwembo (2010) found that maternal age correlates strongly with child survival compared with maternal education.

Conclusion and Gaps

Several gaps which this study aims to fill in objective three were also identified. Firstly, it was noted that many research studies focused on HIV and AIDS epidemic related deaths as the cause of high prevalence of under-five mortality in South Africa. These studies have overlooked other factors that may play a huge role in deteriorating maternal health that lead to child mortality. These factors were identified from Mosley and Chen framework's (1984) as socio-economic factors such as type of place of residence, region, mother's occupation, current employment status and demographic factors include maternal age at first birth, current marital status, maternal education, sex of the child, and birth interval.

Evaluation of the Literature

The related literature reviewed in respect of objective 3 provided in-depth arguments on how demographic factors such as the maternal age, sex of the child, birth interval and birth order influence child mortality. Different scholars have put forward different opinions on how these factors influence child survival. For example, Buwembo (2010) highlight the maternal age as the most influential demographic factor on under-five mortality. Further arguing that the fact that child mortality increases as the age of the mother decreases suggest that child mortality is more prevalent among the children who are born by mothers between the ages of 15-18.

CHAPTER 3: THEORETICAL AND CONCEPTUAL FRAMEWORK

This chapter presents the theoretical and conceptual framework employed in the study. The study adapted and modified Mosley and Chen's framework (1984), a proposed and well-known analytical framework for studying the determinants of child survival in the developing countries. This framework was chosen because of its relevance to the study as it assumes that "all economic and social determinants of child mortality operate through a common set of biological mechanisms proximate determinants or demographic variables to exert an impact on mortality (Mosley & Chen,1984).

Mosley and Chen's (1984) sets the proximate determinants which have a direct influence on the risk of mortality and morbidity. These proximate determinants are categorised in five groups which are maternal factors (age, birth order, birth interval, sex of the child) and environmental factors which are (land, air, water and food contamination (Mosley & Chen, 1984). Apart from the above-mentioned demographic determinants, the Mosley and Chen Framework (1984) also mentioned and examined a range of socio-economic determinants (independent variables) which must operate through these sets of proximate determinants (demographic variables) in order to lead to possibility or risk of infectious diseases which may eventually lead to child morbidity and mortality. These are namely; individual-level variables (fathers and mothers' educational level, health status and time they have available to bear and rear a healthy surviving child as well as societal traditions/norms/attitudes), household-level variables (income and wealth) and also community level variables (ecological setting, health system and political economy).Thus the study has adopted the Mosley and Chen framework (1984) to examine the impact of socio-economic and demographic factors on under-five mortality from the above mentioned categories of proximate determinants from the original work of the framework. This study will therefore only utilise two of them which are maternal factors and individual level variables(demographic factors) and (socio-economic variables).

Table 1: Theories of under-five mortality

s/n	Theory	Key variables	Measurable Indicator	Claimed Causality or Association
1	Human capital model	Human Capital and health	Human health	Link between human resources and population health.
2	Mosley And Chen Determinants of Under-five framework.	Proximate determinants (demographic variables and underlying factors (Socio-economic determinants of mortality.	Socio-economic determinants and proximate determinants of under-five mortality	Socio-economic determinants (independent variables) must operate through the proximate determinants in order to influence child morbidity and mortality.
3	Epidemiological Transition theory	Change in patterns of mortality and morbidity by cause of death from infectious disease to non-communicable disease.	Morbidity and mortality due to infectious disease.	The impact of infectious disease on child survival.
4	Theory perspective of Frailty by Sastry	Socio-economic differences in mortality (unobserved heterogeneity)		Frailty combines in a single measure all the factors that operate to increase or decrease a given individual's mortality risk.
5	Life course approach	The importance of care given to mothers prior their birth	Life stages	Association between maternal health and child survival

Source: Own computation

3.1.1 Human capital model

According to the human capita model most medical interventions need the services of doctors, nurses, or other type of health workers (Dussault & Dubois 2004). This model assumes that in turn, access to health care is one of the determinants of population health at large, with other determinants including socioeconomic, demographic environmental, and behavioral factors. These determinants generate a link between human resources and population health, even if the link might be weakened by the presence of no-health-care professionals. This model assumes that economic development that increases the average income have the strongest power to reduce under-five mortality. But income inequality can weaken the association between high average income and low child mortality rate (Dussalt & Dubois,2004).

The logical connection between this framework and under-five mortality is observed as it indicates that poor access of health may leads to the depreciation of human capital. This clearly shows that children who are exposed to poorer access of health may be more prone to diseases which may eventually lead to death as they grow up before they could even reach their fifth birthday. However this model puts forward the fact that without interventions from trained health workers the population may experience the possibility of diseases which may in turn leads to high rates of mortality and morbidity. Thus poorer children from lower economic status have the highest risk of disease as they cannot afford some medical interventions that are not provided in public health care system. Even though a logical connection between this framework and under-five mortality is observed it is not the selected one to guide the present study, as it does not give in-depth explanation of how these socio-economic factors exert their impact on under-five mortality. Hence the Mosley and Chen (1984) was the chosen framework to guide the present study.

3.1.2 Mosley and Chen determinants of under-five framework

This is the most relevant analytical framework guiding the present study. The framework is applied to this study to explain the pathways through which various determinants of under-five mortality operate in order to affect child mortality. The framework categorises the determinants of child mortality in to two groups namely indirect determinants (for example maternal education, and type of place of residence), and direct or proximate determinants (such as child immunisation and mother's age at first birth). According to this framework proximate determinants have the most direct effect on child deaths. Indirect factors on the other hand are seen as the most distant factors from mortality they operate through one or more proximate factors to affect mortality (Mosley,1984). This approach assumes that the underly-

ing or indirect determinants (socio-economic factors) manifest itself in proximate determinants then the values of these variables influences the risk of diseases which may eventually link to the probability of child deaths. The present study applied the theoretical model of Mosley and Chen (1984) in answering objective 2 and 3's research questions and it fills the identified knowledge gaps in the literature.

3.1.3 Epidemiological Transition

According to Omran (1971) epidemiologic transition focuses on the complex change in patterns of health and disease and on the interactions between these patterns and their demographic economic and sociologic determinants and consequences. This theory assumes that mortality patterns are divided into three stages of epidemiologic transition. The first stage that Omran (1971) identified was namely, the age of pestilence and famine, this is when mortality is high and fluctuating thus precluding sustained population growth in this stage mortality declines the average life expectancy which may leads to the decline of the population growth at large. In this stage the major determinants of death are the epidemics, famine and war (Omran,1971). In the second stage mortality declines progressively and the rate of decline accelerate as epidemics become less frequent. The average life expectancy increases and that may results to the population growth. Lastly in the last stage of age of degenerative and man-made disease, when mortality continues to decline and eventually approaches to stability the fertility becomes crucial in the population growth.

3.1.4 Theory perspective of Frailty

This theory seeks to explain the persisting association between socioeconomic status and health outcomes are diverse. Generally, they explain the causal direction from socioeconomic to health inequality, recalling behavioral factors, material factors and psychosocial factors. Among the explanations, the most important role seems to be played by cigarette smoking and dietary and exercise (Stringhini *et al*., 2010). The frailty framework identifies material factors such as occupational health risks and access to medical care and lastly housing conditions (Krieger & Higgins 2002). This theory assumes that children from lower class families, are more likely to have poor diets, to be of low birth weight, to be more exposed to passive smoking and some infectious agents and to have lower educational opportunities. The theoretical perspectives of frailty provide the close relation between socio-economic status, health and conditions that may lead to under-five mortality. This framework offers an in-depth explanation of how lower socio-economic status of the mother can affect the child's survival. This was not chosen to guide the present study as this theory does not give further explana-

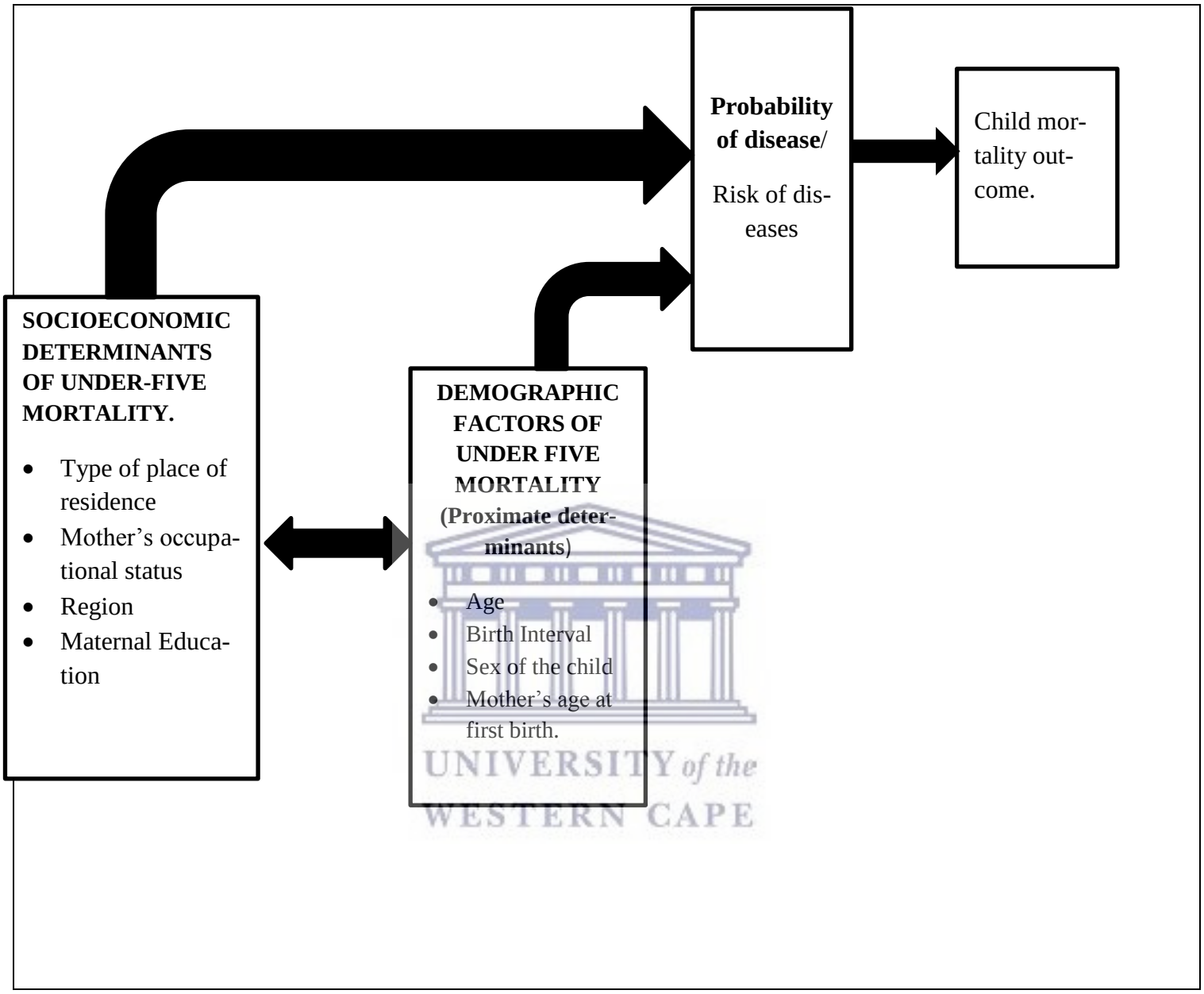
tions on how socio-economic factors and demographic factors influence one another in order to exert the impact on under-five mortality.

3.1.5 Life course approach

The life course approach to socio-economic inequalities in mortality highlights the importance of the possible links between death, which is the final event and the previous events and circumstances experienced while the individual was still young. According to this approach childhood conditions are more important in one's life as they affect the adult and old ages health outcomes. This approach assumes that early exposure to malnutrition for example has been found to have negative effects on blood pressure, obesity and other cardiovascular diseases. According to Hutchison (2007) the life course approach assumes that children from the lower socioeconomic status families are more likely to have poor diets, lower birth weight and lastly, they are more likely to have fewer educational opportunities compared to the ones whose parents are from upper class families.

The main assumption of this approach is that the childhood experiences and conditions manifest later in the life of an individual. The logical connection between this framework and under-five mortality exist as it highlights socio-economic inequalities that may possible lead to the final event which is the child death. This is relevant to the study but it was not suitable as Mosley and Chen's analytical framework as this one focus more on the previous events and circumstances experienced by the individual at an earlier age which may show up or manifest at a later stage. Life course approach does not explain further how these socio-economic inequalities manifest or operate in order to lead to child death as Mosley and Chen's framework do.

Figure 2: Conceptual framework for child survival adopted from (Mosley and Chen Framework,1984).



Source: Author with adaptation from Mosely and Chen, (1984)

Figure 2, above shows the impact of socioeconomic and demographic factors listed in the above figure. The above figure highlights how the impact of socio-economic and demographic factors can play a huge role by influencing one another, to the possibility or risk of infectious diseases which may eventually lead to child mortality. The above figures also suggest that all the regions that had the highest rate of mortality were exposed to the highest risk of diseases. The variables used in this framework were adopted from Mosley & Chen framework that showed the effects of common sets of socioeconomic variables and demographic factor which leads to the probability or risk of diseases. Socio-economic and demographic

variables may influence one another and leads to the risk of diseases such as measles, pneumonia and polio. The above mentioned diseases may occur due to the lack of nutritious food that may keep the immune system of the child strong to fight these diseases. Mosley & Chen (1984) argued that as the immune system of the child is very weak and more prone to the disease it is important for the mother to provide basic care and medical assistance. However, if the mother is still young and unemployed it may be difficult for her to protect the child from the infectious diseases,that predisposes the child to more diseases and inevitably child death. Figure 2 above illustrate that the value of the socioeconomic and demographic variables influences the risk of diseases which link to the probability of child mortality.

CHAPTER 4: DATA AND METHOLOGY

4.1 Research Scope and Design

This chapter focuses on the methodology for the research, which provides detailed information about how the objectives of the study were achieved. Details on the study design, study population, sample size as well as the study variables and their definitions are presented. The data methods which include statistical techniques, procedures of data management and data analysis used are also outlined. Lastly, the chapter highlighted the study limitations and ethical issues pertaining to the present study.

The following items such as the study and sample designs, and research instruments such as questionnaire for data collection and data analysis using SPSS statistics version 25 will all be discussed further. Furthermore, the present chapter also discusses the statistical tests such as the trend analysis for objective for one and descriptive statistics and the binomial logistic regression that were carried out in order to meet the aims of objective two and three. Lastly the independent and dependent variables will be explained and discussed further.

The analysis was conducted at two levels, the first level which is objective 1 analysis was the trend analysis of under-five mortality rates across the provinces from 2000-2015. This was done using the comparative analysis table 1, which was computed using the data of total live births and deaths which was drawn in superweb a statistics South Africa website at a given period across the provinces and within the provinces. Superweb is considered as one of the reliable tools of data extraction as it records the total live births and deaths routinely. Furthermore, graphs were presented to show the trend, percentage change across the provinces and annual average rate of under-five mortality in all the provinces. To compute the under-five mortality rates for each province the study employed the direct demographic technique under-five mortality rate formula .To analyse objective two and three the study employed binary logistic regression, for the second objective binary logistic regression was employed to see the influence of socio-economic variables (independent variables) which are predictors of under-five mortality and lastly for objective three binary logistic regression was also employed to estimate the influence of demographic variables on under-five mortality rates. To estimate the levels of under-five mortality the study employed the direct demographic technique using the below formula:

Under-five mortality rate (IMR) = Deaths between 0-4 years at a given a period * 1000

Total live births of 0-4 years at a given period

Source: Preston *et al*., (2001)

Demographic health survey was selected because it produces high quality data on women fertility and children also it produces mortality trends and levels compared to other surveys (SADHS,1998). Like other surveys demographic health survey has its weaknesses and strengths. One of the strengths is that it collects birth histories and also data on socioeconomic status, health and education which is important in the context of this study as it will provide more information on socioeconomic factors which greatly influences the under-five mortality in South Africa.

4.2 Study population design and analytics

The study utilises secondary data analysis of the 1998 South African demographic health survey. The dataset is a nationally representative cross-sectional data. The survey was conducted as part of the National health Information system of South Africa (Demographic health survey report, 1998). It was intended to assist policy makers and programme managers in evaluating designing programmes and strategies for improving health service delivery in the country. Information related to births and deaths during the five years preceding the survey date was collected.

The 1998 South African Demographic health survey (SADHS) was a nationally representative probability sample of approximately 11735 completed interviews among women between the ages of 15-49. The study did not utilise other datasets such as 2003 SADHS due to the poor quality of the data and it was not made available to the public domain, General household survey was not used as it does not address issues on under-five mortality. The sampling frame of 1998 SADHS consisted of approximately 86 000 enumeration areas (EA) that was created by the central statistics service for 1996 census (SADHS,1998). In each stratum a two-stage sample was selected; the primary sample unit (PSUs) which was selected with the probability proportional to the size. The EAs ranged from about 100 to 250 households and they were stratified by province, urban and non-urban residence.

4.3.1 Study population

Out of the sample frame of 86000 EAs, a total of approximately 11735 women of the reproductive age group 15-49 years were interviewed in the survey. The data provided by these women as well as data of death occurring to infants and to children under 5 were examined.

4.3.2 Data analysis and methods

The statistical package used to analyse the data was SPSS version 25. Analysis was conducted on two different levels namely; univariate and bivariate. The univariate analysis involved the descriptive statistic of the respondents, bivariate analysis of a binary logistic regression was also conducted to examine the impact of socio-economic factors on under-five mortality and also to test the predictive ability of demographic variables on under-five mortality.

4.4 Tests Conducted

4.4.1 Logistic regression

In order to determine the effects of various socioeconomic and demographic variables which play a huge role in determining the under-five mortality in South Africa a bivariate logistic regression analysis was applied, it was employed in order to evaluate the effects of socioeconomic and demographic variables on the dependent variable which is under-five mortality. It assessed the direction of association for each variable in relation to under-five mortality and how they influenced under-five mortality through the pathways of proximate determinants

Logistic regression estimated the odd of a certain event occurring. In this study logistic regression was used to analyse objective two and three. It was employed in order to predict under-five deaths. According to Pallant (2005) Logistic regression can be used to predict whether an event will occur or using a set of independent predictor variables furthermore it can be used to explain the percentage of variance in the dependent variable which is explained by a specific predictor variable. According to Gbemisola (2016) binary logistic regression was first introduced by David Coxin in 1958 and it can be used not only to identify risk factors but also to predict the probability of success or failure of an event. This model is typically used when predicting an event which has two possible outcomes for instance pass vs. fail or 'alive vs. dead'. The predictor which is an independent variable can be either categorical or continuous or a mix of both. All predictor variables can be tested to assess their predictive ability while controlling the effects of other predictors in the model.

The binary logistic regression model was used in the present study in order to examine and predict the likelihood or probability of a child dying before reaching the age of five years in

South Africa. One of the advantages of a logistic regression model is that the independent variables do not necessarily need to be normally distributed; secondly it does not assume a linear relationship between the dependent and independent variables (Buwembo, 2010).

4.4.2 Assumptions of a binary logistic regression

A. Sample Size

The number of cases in the sample and the number of predictors (independent variables) in the model are very important. If the sample size is small, but have a large number of predictors, there will be problem with the analysis (including the problem of the solution failing to converge). This is common when there are categorical predictors with limited cases in each category. To deal with this problem descriptive statistics will be conducted on each predictor, and those with limited numbers were collapsed or deleted.

B. Multicollinearity

Pallant (2005) argued that multicollinearity occurs when one or more of the independent variables in the model can be approximately determined by some of the other independent variables. When there is multicollinearity, the estimated regression coefficients of the fitted model can be highly unreliable. There is a need to check for high intercorrelations among predictor (independent) variables. Ideally, the predictor variables will be strongly related to the dependent variable but not strongly related to each other. Collinearity diagnostics can be conducted to test for multicollinearity. Tolerance values that are very low (less than 0.1) indicate that the variable has high correlations with other variables in the model. This implies that there may be need to reconsider the set of variables that should be included in the model and require that one of the highly intercorrelating variables be removed.

Another method of identifying highly correlated covariates is by producing their correlation matrix. Any two variables that have a correlation coefficient which is greater than 0.85 may be considered to be highly correlated. The simplest way to resolve multicollinearity problems is to reduce the number of collinear variables until there is only one remaining out of the set. Alternatively, it may be possible to combine two or more closely related variables into a single input variable.

C. **Outliers**

There is a need to carefully look out for outliers or cases that are not well explained by the model. In logistic regression terms, a case may be strongly predicted by the model to be one category but in reality, be classified in the other category. These outlying cases can be identified by inspecting the residuals, an important step if there are problems with the goodness of fit of the model.

$$\text{Log}[P1-P]=\alpha+\beta 1\ X1+\beta 2X2+\cdots+\beta k\ Xn+\mu$$

The model shows the odds of under-five mortality. In this study, P is under-five mortality, while $X1\ldots Xn$ represent the independent and intervening variables and $\beta 1\ \ldots \beta k$ are the odds ratios.

P not occurring. Where α is value of under-five mortality when all the independent and intervening variables are held constant. Log [P1−P] is referred to as the logistic transformation of probability of p occurring or the probability of a death.

Binary regression model was used in this study to predict the odds of occurrence of under-five mortality in South Africa as influenced by the underlying socio-economic variables.

4. 6 Definition of selected variables

Table 2: Definition of selected variables

Variable name	Coding	Definition
Dependent Variable		
Child Survival (under-five mortality).	0=Alive 1= Died	This variable refers to the age at death in children aged 0-4 years it is expressed as per 1000 live births.
Independent Variables		
Mother's age at first birth	1=15-19; 2=20-24; 3=25-29; 4=30-34; 5=35-39; 6=40-44; 7=45-49	This refers to the mother's age at first birth it depicts the mothers age from the reproductive ages of 15-49.
Birth Order number	1=Birth order 1; 2= Birth order 2; 3=Birth order 3; 4=Birth order 4; 5=Birth order 5; 6=Birth order 6; 7=Birth order 7; 8=Birth order 8; 9=Birth order 9;10=Birth order 10;11=Birth order 11; 12=Birth order 12; 13=Birth order 13; 14=Birth order 14	This refers to the sequence of birth order numbers used in the study. There were 1 up to 14 birth order numbers.
Sex of the Child	1=Male; 2= Female	This refers to the sex of the child with two categories with one being male and the other one female.
Mother's Education	0=No education; 1=Primary,2=Secondary; 3=Higher	This refers to the mother's highest education level.
Birth Interval>=4years	0=No;1=Yes	This variables refers to the mothers whose birth interval was>=4years and those who did not experience the birth interval of >=4years.
Region	1=Western Cape; 2=Eastern Cape; 3=Northern Cape; 4=Free State; 5=Kwazulu Natal; 6=North West; 7=Gauteng; 8=Mpumalanga; 9=Limpopo province.	This refers to the nine provinces/(regions) of South Africa.

Type of place of residence	Urban=1; 2=Rural	This variable refers to whether the mother resided in urban or rural areas.
Mother's Occupational Status	1=Not working, 2="Prof .,Tech., Manag." 3=Clerical; 4= Sales; 5= Agric- self-employed, 6= Agric employee; 7=Household and domestic; 8=services;	This variable refers to the type of Occupational Status that the mother had.

Source: Own Computation

4.6.1 Dependent variable

Under-five mortality

The dependent variable for this study is under-five mortality (death before reaching the fifth birthday). The response whether the child is alive, or dead was coded as 1=Died and 0=Alive

4.6.2 Justification of Independent variables

4.6.2.1 Socio-economic variables

Mother's highest Education

Four categories will be created for this dummy variable. Mothers that had no education, primary, secondary school (matric) and higher education. Recent literature such as Rademeyer (2017) examined the impact of socioeconomic factors on under-five mortality and highlighted the following variables namely, type of place of residence, region and mother's highest educational level. Similarly, Buwembo (2010) examined the impact of socioeconomic factors in predicting the outcome of child mortality. Buwembo (2010) studied socioeconomic variables such as mother's education, place of residence and mother's labour market status. One of the most explanatory variables in the literature has been found as mother's education.

A study conducted by Raji (2010) found that there have been consistent findings that the children of women having better educational opportunities experience lower under-five mortality rates as compared to their counterparts. Although it may vary while (Ware,1984*)* suggested that it may vary among study population. It has been found that education of parents, especially mother's education has contributed massively to the determinants of the level of mortality among infant and children under the age of five. Maternal education of 4-6 years of duration has been investigated and found to be associated with a decrease of 20 percent in infant mortality (Syamala, 2004*)*. Well educated mothers are more informed of the modern health facilities as well as the nutrition and the hygienic practises This suggests that economic prosperity and development in the education of the mother has helped to reduce child mortality in more than 60% of the counties of China (Wang *et al*., 2016). Maternal education can produce equal results whether in rural settings or urban slums. Even basic health education of the mother helps to increase vaccination coverage (Johri *et al*., 2015).

Type of place of residence

A study by Buwembo (2010) revealed that in the least developing countries mother's type of place of residence showed more impact on child survival and nutritional status. Similar re-

sults have been documented by researchers such as Yi *et al.,* (2011) from China where he found that neonatal health is more prevalent in rural areas and requires special attention from the health authorities. Another study from Kenya demonstrated that the differences in childhood mortality between urban and rural population are decreasing with time (Buwembo, 2010). Recent literature by scholars such as Macassa *et al.*, **(**2012) found that higher child deaths were associated with the mother's residences in some provinces in Mozambique, and these were not only related to the environmental variables but rather to other variables such as income distribution and distribution of infrastructure including health facilities.

Mother's occupation

Six categories of the mother's occupation were created, and these are not working, Prof. tech managerial, clerical, sales, agricultural self-employed, agricultural employee household and domestic, services, skilled manual and unskilled manual.

It has been found that motherhood largely depends on the quality of care provided by mother on her child. Being an employed mother is a tough responsibility on its own especially for the health outcomes of underage children. Employed mothers with a good adjustment between workplace and family can provide quality care for their children (Poduval *et al.,* 2009). However earlier research from India showed that mortality rate of children under age of 5 is greater for the employed mother (Sunita *et al.*, 1998). A qualitative study conducted to observe the impact of maternal employment on nutritional and health status of child found that mothers working long hours affected the children's nutritional status and adequate care arrangements.

Region

This variable was classified in the present study into nine provinces of South Africa which are the Eastern Cape, Western Cape, Northern Cape, North West, Free State, Limpopo, Kwazulu- Natal, Gauteng Province and Mpumalanga**.** These variables have been used in several studies in relation to the under-five mortality. Rademeyer (2017) found that the prevalence of child morbidity and mortality varies according to the type of region. For instance, it was reported that child mortality in South Africa is characterised by large spatial differentials which are strongly associated with the level of socio-economic disparities, each province reflects broad socioeconomic inequalities and development status. Rademeyer (2017) found that in the poorer provinces such as Limpopo, Eastern Cape, and Kwazulu-Natal there were very

high rates of child deaths as compared to the richest provinces such as Western Cape which is considered as the richest one with a high per capita income.

4.6.2.2 Demographic variables

Mother's age at birth

This is mother's age at the time of birth of the subject child. It was derived by using the current age of mother and the child's year of birth. Five categories were created i.e. 15 – 20 years, 20-29 years, 30-39, 40-44 and 45-49 years old.

A study by Motsa (2014) found a significant relationship between the mother's age and child survival. Motsa (2014) found that the age of the mother is one of the important causal factors of under-five mortality. A study conducted in Uganda by Ssewanyana and Younger (2007) revealed a lower likelihood of mortality among infants born to older women compared to infants born to younger women. However, a study by Charmabagwala *et al.,* (2004) found that older mothers were likely to experience child death than young mothers. In studies conducted in different parts of the world, it has been revealed that birth to women less than age 18 and above age 35, first and higher order births are tending to have a higher risk of infant child mortality during their year of live. It is believed that a young mother is not biologically matured; hence the possibility of pregnancy related complications is high.

A similar study by Buwembo (2010) have revealed that the age at birth is highly associated with the levels of infants and child mortality. In a number of studies conducted in different parts of the world, it has been revealed that birth to women less than age 18 and above age 35, first and higher order births are tending to have a higher risk of infant child mortality during their year of live. It is believed that a young mother is not biologically matured; hence the possibility of pregnancy related complications is high.

Sex of the Child

Sex is dichotomous: the female was the reference category and thus coded 2 and a boy,1**.** Several research studies have shown mortality differentials by sex of the child (Motsa,2014). Male mortality have been reported to exceed female mortality in the neonatal period, but this differential is reversed in the post-neonatal period. Higher female than male mortality continued through childhood and this is supported in studies by Chen, *al.,* (1984). Furthermore, a research study by (Ezeh,2015) from Nigeria showed significantly higher risks of under-five mortality for male children in comparison to female. Similar results were also reported in an-

other analysis from several countries of Sub-Saharan Africa that male children have significantly higher chances of mortality than girls before reaching the age five (Boco, 2015**).**

Birth Order number

Birth order was classified as firstborn, second order, third order, or fourth or higher. The reference category was the 14th birth order. Results from Kamal (2012), have indicated increased risk of neonatal mortality among higher-ranked births, while other studies have found the risk increased for the first or lower-ranked births(Buwembo,2010). The relationship between birth order and infant and child mortality is illustrated as taking the form of a U-shape. Generally, the risk of dying at infancy and childhood is described as higher among first birth order born by very young mothers, it steadily declines with subsequent birth orders and mother's age and then starts increasing again (Mekonnen, 2011). Motsa (2014) argued that studies have shown contradictory results with regards to the relationship between birth order and under-five mortality. Some studies have revealed the risk of dying at infancy and childhood is described as higher among first birth order born by very young mothers however some studies have found the risk increased for the first or lower-ranked births (Kamal,2012).

Birth Interval

This variable was classified as less than or equal to 4 in order to limit the possibility of continuous responses. Several studies on under-five mortality have shown the high risk of child deaths for children with short birth intervals, whereas long births of intervals were associated with the lowest risks of under-five mortality. This relationship has been explored by several scholars such as Buwembo (2010) and Motsa (2014) where they have concluded that extended length of birth intervals reduces the incidents of infant and child mortality. Therefore, based on the various research findings they obtained, longer birth intervals are associated with higher chances of child survival and shorter ones are associated with lower chances of child deaths. Addedini (2013) found that the competition for resources between the siblings may be the reason of high possibility of infectious disease which may eventually lead to child deaths.

CHAPTER5: RESULTS AND DISCUSSION

5.1 Introduction

The current chapter presents the results of the two types of analysis that were performed in the research study. Firstly, the comparative analysis results for objective one which compares mortality rates across the provinces will be presented and discussed further, followed by the results from the binomial logistic regression analysis for both objective two and three. To estimate the levels of under-five mortality rates in the provinces the study employed the direct demographic technique for measuring the under-five mortality using below formula. The following narrative discussed below is for the year trend analysis from the period of 2000-2015.

Objective 1: to compare the levels of under-five mortality rates across the provinces

Table 3: A comparison of the levels of under-five mortality rates across the provinces in South Africa according to the Preston et al., (2000) formula.

Year	**EC**	**WP**	**NW**	**NC**	**GP**	**LP**	**FS**	**KZN**	**MP**
2000	24.6	39.6	69.6	61.8	58.0	20.8	86.4	43.3	41.7
2001	27.2	39.4	77.5	66.8	60.4	22.5	88.2	47.3	42.8
2002	31.2	42.6	86.0	61.2	67.7	26.8	95.4	48.5	52.0
2003	36.9	42.7	88.4	58.4	74.7	30.7	104.1	56.0	57.2
2004	39.2	42.9	85.9	62.8	61.9	31.3	111.9	55.2	55.4
2005	37.9	38.5	89.2	55.3	68.0	57.1	110.6	58.3	32.9
2006	46.4	32.4	123.8	57.3	60.2	47.5	117.1	58.4	64.4
2007	36.0	29.5	109.2	68.2	63.7	51.5	121.7	59.7	69.7
2008	37.1	31.6	103.8	73.4	64.3	52.7	121.3	58.4	67.4
2009	38.2	40.6	93.2	63.7	68.7	53.1	111.5	61.6	61.2
2010	42.1	38.4	87.4	69.3	52.0	46.9	102.8	52.8	54.2
2011	32.4	34.4	73.5	51.0	44.0	37.9	89.6	45.2	42.5
2012	30.9	33.6	67.8	57.1	43.8	44.6	70.8	45.9	45.3
2013	30.9	35.7	76.0	63.7	41.6	44.6	73.2	44.4	**43.2**
2014	27.2	34.8	62.1	54.2	44.3	36.5	62.0	41.4	37.3
2015	25.8	35.0	60.8	48.4	43.7	36.2	58.7	37.7	37.9

Data Source: Own calculation from super web data from 2000-2015

Table 3. above presents the levels of under-five mortality rates by province of death of occurrence from 2000-2015. Values of under-five mortality rates were not directly available from statistics South Africa; the presented rates of under-five mortality rate were computed from registered births and deaths that were recorded in the superweb. The following result and discussion is based on the above table.

In the year 2000 the Free State Province (86.4), reported high under-five mortality rates followed by North West (69.6), Northern Cape (61.8), Gauteng province (58.0), Kwazulu-Natal (43.3), Mpumalanga (41.7), Western Cape (39.6), Eastern Cape (24.6), and lastly Limpopo had (20.8) under-five mortality rates. There have been geographical variations of under-five mortality rates between these provinces due to different driving forces and inequalities.

According to the report released by the Western Cape Burden of Disease Reduction Project (2007), the Western Cape Province had the lowest under-five mortality rate in 2000 compared to other provinces. It has been reported that over half of child deaths that were reported in Western Cape Province were due to diseases of underdevelopment and poverty. The proportion of HIV/AIDS related deaths was approximately 16% in infants and 38 % in children between the ages of 1 and 5. However these results were not consistent with the under-five mortality in the above table.

Most provinces such as Free State, North West, Northern Cape, Gauteng and KwaZulu-Natal indicated a general increase in the number of under-five deaths in this period. However, an unusual decrease was simultaneously observed in under-five deaths in other provinces. Eastern Cape and Limpopo province had the lowest under-five mortality rates in 2000 compared to other provinces. This could be due to the number of factors such as under reporting of deaths, these are rural provinces where vital statistics are not well registered. According to Statistics South Africa (2006), this may lead to lower estimates of the total number of deaths that have occurred in the province and may lead to an under-estimation of some causes of death. The findings reported for these above two mentioned rural provinces were found to be consistent with the under-five mortality rates that were found by Nannan *et al.,* (2012).

Nannan *et al.*, (2012), also reported an unusual decrease of deaths in provinces such as Kwa-zulu- Natal and the Eastern Cape between the period of 2000-2001.It was noted that these provinces experienced administrative deficiency in their registration of vital statistics (Nannan *et al.*, 2012). This indicates that in most parts of rural areas there is a very poor quality of death registration, where in some cases so many people do not even go to the Department of Home of Affairs to register death of their loved ones. In addition, the rank order of the causes of deaths varies within different provinces. Nannan *et al*., (2012) reveals that the misclassification of the causes of child deaths is problematic, more particularly for HIV related deaths which are often not disclosed. However, this is different in birth registration system which seems to appear to be more than 80 % complete.

Diarrhoeal disease remained the common cause of under-five deaths in rural areas such as Limpopo, Mpumalanga and the Eastern Cape while neonatal conditions are more prevalent in all other provinces (Chola *et al*., 2015). The highest under-five mortality rate in 2001 occurred in Free State 88.2 per 1000 live births followed by North West 77.5 per 1000 live births and Northern Cape 66.8 per 1000 live births. However, an unusual decrease was observed in provinces such as Limpopo province which had 22,5 per 1000 live births, Eastern Cape 27.2 per 1000 live births followed by Western Cape 39.4 per 1000 live births, Mpumalanga (42.8) and lastly KwaZulu-Natal which had 47.3 per 1000 live births in2001.

In the year 2001 Free State and North West province had the highest under-five mortality rates compared to other provinces because this was the period where most of South African provinces were battling with the highest prevalence of HIV and AIDS. Furthermore, it was the time whereby the health sector had not developed or implemented intervention programme that could prevent the transmission of HIV and AIDS from the mothers to the children. This was therefore a period where policy programmes and intervention such as PMCT (prevention of mother to child transmission) were not implemented and anti-retroviral treatment was not yet persuaded to many health provincial departments, more especially in rural areas. This could account for the high rate of under-five in places such as Free State province. In contrast, provinces such as Western Cape did not have high under-five mortality rates due to the earlier roll –out of PMCT, it has been reported that in 2003 Western cape province reached a 100 % roll-out of prevention of mother- to-child transmission (PMTCT) (Darikwa, 2009).

In addition, Nannan *et al*., (2012) found that even though the National PMCT coverage is high at 96% coverage, there is evidence that it still varies between different provinces and districts. Moreover, there are gaps in post-natal care infant follow-ups as well as late registration at antenatal clinics which may also hinder progress in managing prevention-of mother-to-child –transmission. In this period Anti- retroviral treatment was not yet discovered and medication such as nevarapine that could prevent the transmission of HIV and AIDS to unborn child was not yet developed hence there was a high death rate of under-five. In addition, most sectors in Free State and North West province are rural areas and useful resources such as health facilities are inaccessible. Mobile clinics in these provinces only comes twice in three months and that could have a negative impact to old people and more especially to the pregnant mothers who need regularly visits to medical professionals whether there are no complications or not. In 2002 the highest proportion of under-five deaths was amongst the provinces such as Free State (95.4) followed by North West which had an increase of 86.0 per 1000 live births from 77.5 per 1000 live births in 2001. These deaths were attributed to the preventable diseases such as measles, pneumonia, and polio.

This outcome is confirmed by several researchers such as (Ogada, 2014 and Buwembo,2010) by stating that under-five mortality rates vary according to the type of place of residence and region. This is evident in the above table 3, that shows variations of under-five mortality rates between rural and urban areas, the disparities in rural areas are indicated in provinces such as Free State, Eastern Cape, Limpopo province, Mpumalanga and Kwazulu-Natal. These provinces experienced high rates of under-five mortality with Free State being the province that reported high rates compared to other provinces. Provinces such as Western Cape, Gauteng, North West, and Northern Province reported very low rates of under-five mortality. During the period of 2002, all the provinces had a sudden increase of child deaths compared to the previous years except the Western Cape Province which experienced a decline of 3. 2. Free State (95.4) had the highest proportion of under-five mortality rates followed by North West (86.00). Further increase was observed in Northern Cape (66.8).

In 2003 child mortality rates rose steadily in all the provinces except Northern Cape Province. In this period Free State had high rate of child mortality of (104.1), followed by North West (88.4). Followed by Gauteng province which had 74.4 per thousand live births, followed by Northern Cape which had 58.4 per thousand live births and lastly Kwazulu-Natal province had 56 per thousand live births. The sharp incline of under-five mortality rate that was observed in the previously-mentioned provinces was due to the number of factors such as

that in this period provinces such as North West had a high rate of teenage pregnancy, the inability to raise the child and the lack of knowledge of adolescents could also lead to high childhood mortality. This is because most of the mothers are still teenagers that also need guidance from parents. In this case, they cannot raise children on their own and due to low literacy levels they could also cause deterioration of child's health. In addition, there is a strong association between child survival and immunisation. The report of the South African Demographic and Health Survey (2003) revealed that there has been a marked decrease in immunization rate as only 62% of children aged 12-23 months were immunized against measles in 2003 compared to 82 percent in 1998 (South African Demographic and Health Survey report, 2003).This clearly shows that the lack of immunisation among children under the age of five years may also contribute to the high rate of child deaths as children are young they are vulnerable and more prone to early life diseases such as measles and pneumonia hence they need to be vaccinated against these diseases at an early stage.

In contrary to the above-mentioned provinces the remaining provinces also displayed lower under-five mortality rates in 2003 due to several reasons. Western Cape had 42.7 per thousand live births, followed by Eastern Cape which had 36.9 per thousand live births and lastly Limpopo province which had 30.7 per thousand live births. Under-five mortality rate was low due to several reasons in these provinces in rural provinces such as Eastern Cape and Limpopo province many deaths were not registered during this period hence there was a very low rate of under-five mortality. It has been noted that developing countries experience the major problems within the vital registration system more especially in rural areas as a data source is very poor in its quality (Rademeyer,2017). In addition, vital registration system is the frequent delay in compilation and publication of the current data. In the Western Cape Province the under-five mortality rate declined in this period because it coincides with the time where the where the provincial department of health in the Western Cape initiated the provision of Highly active antiretroviral therapy (HAART) (CSSR,2006). According to the report issued by Centre for Social science Research (2006), this is the year whereby the department applied for external funding to fight AIDS, tuberculosis and malaria and the proposal was successful hence the province scaled up its HAART programme compared to the other eight provinces in the country.

It is evident from the above table that Free State, North West and KwaZulu–Natal had the highest under-five mortality rates throughout the years. In KwaZulu- Natal particularly there is a high level of uneducated females and school dropouts are very high (StatsSA, 2012). This

may have negative impact on mothers and children in the society with the consequence that infant and child mortality are not declining.

There has been an observed declining trend in the under-five mortality rate since 2007 to 2009. This trend was observed between all the provinces with the greatest decline in the period of 2007 to 2009, occurring in the North West province where it fell from 109 to 93.2. The second greatest decline occurred in Mpumalanga with the smallest decline of less than 1 % in the Limpopo province. Limpopo is the only province with a fluctuation in the under-five mortality rate which increased from 51.5 in 2007 to 52.70 in 2008 before falling to 53.1 in 2009.

However, the above-mentioned results that were derived were inconsistent with the studies conducted by (Buwembo,2010 & Garene & Gakusi ,2005). The results they obtained showed a decrease of 6 per 1000 live births of under-five mortality rates in the period of 2006.However this was not the case in the present study as a sudden increase of under-five mortality rates was observed in provinces such as Free State, North West, Nothern Cape, Kwazulu- Natal and lastly the Mpumalanga province. Other provinces such as Limpopo, and Western Cape showed a marked decrease in this period.

The increase was attributed to the deterioration in child health due to HIV and AIDS which became the largest cause of deaths in children younger than five years. However, between 2007 and 2010 South Africa reduced under-five mortality rates by approximately 40 %. In this period progress on reducing child mortality has occurred due to several policies and programme changes that were implemented.

There are provincial disparities in under-five mortality rates in South Africa. As indicated in table 3 above current levels of under-five mortality in each province is way above the international target that is set for South Africa by 2015. For South Africa to achieve millennium development goal 4 which is to reduce under-five mortality by two thirds, each province would have to reduce its under-five mortality to at least to 20 per 1000 live births by 2015. In 2007 an incline of under-five mortality rates was observed in some provinces whereas other provinces showed a greatest decline from 2006. Provinces such as Free State showed a marked increase from the previous year with free state having the highest rate of under-five mortality of 121.7 per thousand live birth, followed by North west 109.2 per thousand live births, Mpumalanga 69.7 per thousand live births Northern Cape 68.2 per thousand live birth), Gauteng province 63.7 per thousand live birth, Kwazulu-Natal 59.7 per thousand live births and

lastly Limpopo province which had 51.5 per thousand live births, which is an increase of 4 per cent from 2006. While these mentioned provinces showed an increase of under-five mortality, provinces such as Eastern Cape, Western Cape and North West showed a decline during the period of 2007 with North West having the highest under-five mortality rate of 109.2 per thousand live births which is a greatest achievement from the previous year which is a decline of 14.6 per cent. Followed by the Eastern Cape which had 36 per thousand live births. Lastly Western Cape which showed 29.5 per thousand live births.

Despite the variations across the provinces there were reductions in under-five mortality rate in all nine provinces between 2007 - 2009.Garenne & Gakusi (2005) argues that the decline was attributed to steady economic growth and major improvements in nutrition, housing, and living conditions. Garenne and Gakusi (2005) further points out that during the above developments the first benefits were improvements in water and sanitation, hygiene, child feeding practices and the development of vaccinations. New technologies and more costly medical interventions were the main source of the steady decline in under-five mortality across the provinces during the period of 2007 and 2009.

In 2010 the highest decline of under-five deaths was observed in most of the provinces except in Eastern Cape and Northern Cape Province. There was a highest increase of 3.9 under-five deaths in the Eastern Cape Province where it was 38.2 in the previous year and it fell to 42. 1 in 2010,while an increase of 5.6 was observed in the North West Province where it was 63.7 and fell to 69.3 in 2010. Bradshaw & Dorrington (2000) *et al*., suggested that this increase was attributed to the completeness of vital registration in the rural provinces.

The decline was observed in other provinces except in these two. Differences between provinces can be explained by the fact that some provinces such as the Eastern Cape are dominated by a largely rural population that is poorer, has lower levels of education, poorer access to health facilities and overall poor living conditions (Rademeyer,2017).

On the contrary, the decline in other provinces such as the Western Cape, and Gauteng provinces was caused by different interventions that were developed after the country was battling with HIV and AIDS. There was a rollout of Anti-retroviral drugs which aimed to protect young mothers from transmitting the disease and the country aimed to reach Millennium development goal which is to reduce the under-five mortality rates by the two thirds hence different interventions were implemented to curb the prevalence of under-five mortality rate. Also, Western Cape Province and Gauteng Province have more access to basic services pro-

vided to the population higher levels of education and more households with piped water. Such differences clearly show the economic standing of each province and also reflects the gaps in socioeconomic conditions and access to health services between rural and urban areas (King-Shung & Proudlock,2002). This is evident from table 3 above from the period of 2010-2015 there was a sharp decline of under-five mortality rates in all the provinces. This is because there were only five years left before the millennium development goals four reach the maturity date. The goal was to reduce under-five mortality rate to 20 per 1000 live births even though South Africa was very far from achieving that.

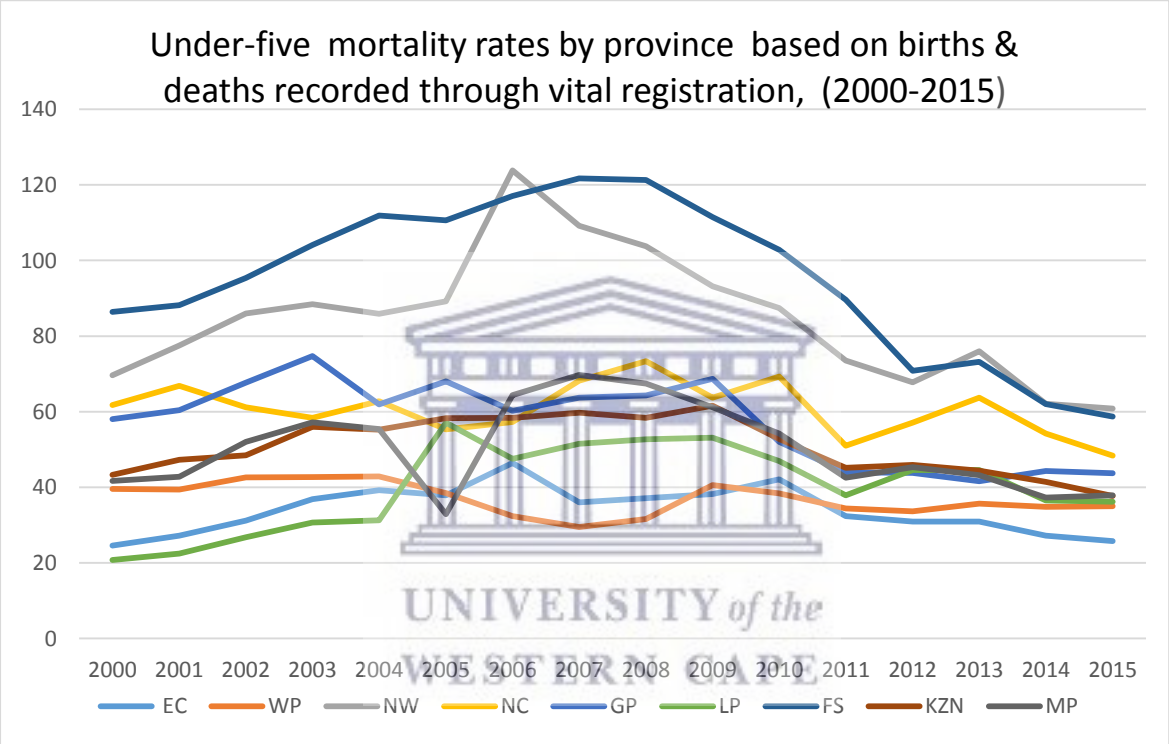
This has been evident from the results produced in table 3 above that there was a decrease of under-five mortality during the period of 2011-2015. The results produced by Udjo (2014) agreed to the results produced by the present study. Udjo (2014) revealed a significant decline of under-five mortality rates from the period of 2011-2015. It is evident that South Africa is making a progress to reach the goals that were set out in the MDGS. The observed decline in this period clearly shows that South Africa has been progressing in ensuring that the necessary policies and implementation of initiatives were in place to reduce under-five mortality.

The driving force behind the reduction of under-five mortality during this period was attributed to the implementation of the constitution and legislative framework that aimed to protect the rights of the children. These were the policies that aimed to address child poverty and ill-health with provision of free health services (Stats SA, 2015). These policies brought forward the introduction of the child support grant that played a huge role in promoting nutritional, educational and health outcomes among children. Furthermore, Improvement in access to clean water and sanitation for many households made a huge impact in declining under-five mortality rates. Other interventions that have made a huge contribution in declining the under-five mortality rate include improved coverage of key child survival such as immunisations, promotion of exclusive breastfeeding, PMTCT, anti-retroviral therapy (ART) and treatment of common childhood illnesses (such as diarrhoea and pneumonia) using the Integrated Management of Childhood Illness (IMCI) approach (Stats SA, 2015).

In addition, interventions that were implemented include the increase in PMTCT which is a prevention of mother-to child transmission which refers to the intervention to prevent transmission of HIV and AIDS from HIV positive mother to her infant during the process of pregnancy, labour, delivery or lactation period. Anti-retroviral therapy (ART) and immunisation

coverage also played a big role in declining the high rates of under-five mortality. South Africa has developed policies, programmes and special interventions to prevent childhood mortality. However, these above-mentioned interventions were not always as effective as they should be. In some provinces PMTCT was not effective due to various reasons such as the low coverage whereas it was effective and well implemented in provinces such as the Western Cape (CSSR, 2006).

Figure 3: Under-five mortality rates by province based on births & deaths recorded during the period of (2000-2015).

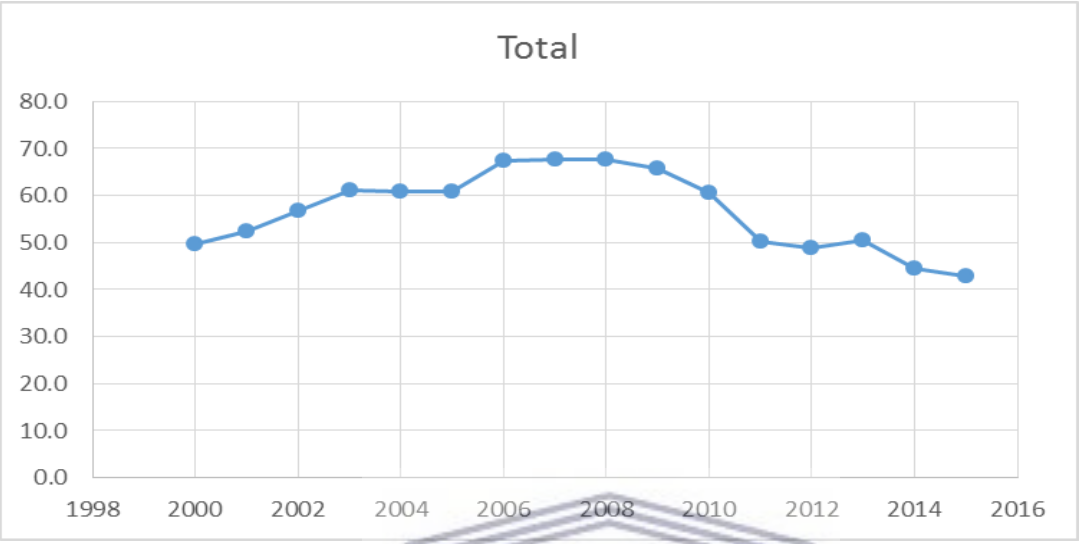


Data source*:* Own computation from super web data from 2000-2015 figures.

Figure 3 above presents the under-five mortality rates in South Africa by province from 2000-2015. Figure 3 Shows figures of under-five mortality rates in South Africa by province for the years 2000-2015, over the 15-year period two distinct trends can be observed from the above figure. The number of under-five mortality rates increased consistently from 2002 and peaked in 2006 and the following pattern shows yearly declines for each province from the period of 2007 to 2015. The highest under-five mortality rate was reported in the Free State which reported the rate of 86. 4. This rate is almost three times higher than the rate of 39.6 which was reported in the Western Cape Province. The Northern Cape (61.8), North West (69.6), and Gauteng (58.0) also reported higher under-five mortality rates whilst Eastern Cape (24.6), Limpopo (20.8), and KZN reported low levels (43.3) of under-five mortality.

The reported low levels in a number of rural provinces such as the Eastern Cape, Limpopo and Kwazulu-Natal prove that the high level of under-reporting may be a leading factor.

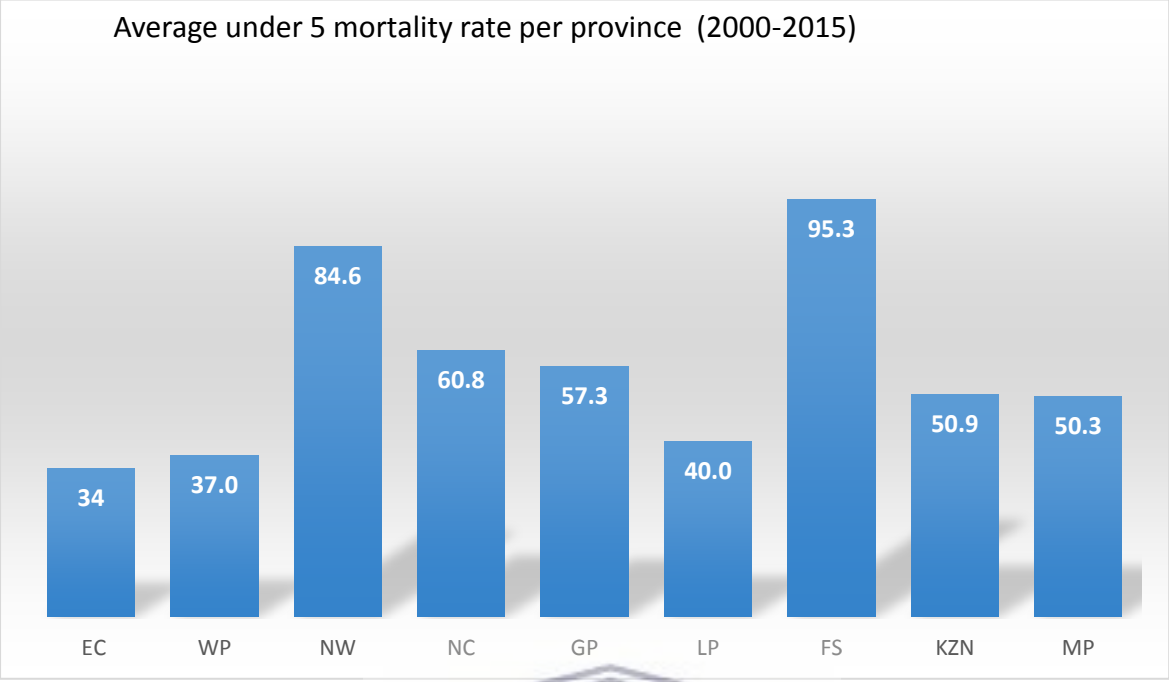
Figure 4: The percentage change of under-five mortality in South Africa from 2000-2015.



Data source: Own computation from super web data from 2000-2015 figures.

Figure 4. above figure shows the percentage change in the number of deaths from one year to the next year from 2000-2015. This is to provide an indication of variations in under-five mortality rates between these years. It has been evident from the above figure that the interventions that were implemented haven't been effective in some provinces. Figure 4 Indicate very narrow levelling off in under-five deaths over the years. The percentage change of under-five mortality was 5.9 per cent which was a good improvement compared to the previous years. The results that were found by Rademeyer (2017) also conform to the present study, an annual rate of reduction increased from 1.6 percent in 1990s to 4.1 percent in 2000–2015 (Rademeyer, 2017). In the year 2001 the percentage increased to 8.3 percent which is a good indication as the MDG 4 that was set was about to mature.

Figure 5: Average of under-five mortality rate per province from 2000-2015.



Data Source; Own Computation from super web 2000-2015 figures.

Figure 5. above shows the national average of under-five mortality, it indicates how it has increased and decreased over these years. In 2001 the national average of under-five mortality was -5.9 and it increased to 16.3 in 2002, this coincided with the period where there was a high rate of HIV and AIDS. Hence there was a high variation around this period. In 2003 there was a percentage change of 7.4 which is a decrease of 8.9 which was quite an improvement. In 2004, low percentage change of -0.5 was observed. However, after 2004 there was a peak in 2005, 2006, 2007 and 2008. This peak shows high percentage change of under-five mortality rate as this was the time when a lot of policy programmes and interventions were implemented to lower under-five mortality rates. After this period the percentage change increased till 2015 because the goal was to reach Millennium development goal which is to reduce under-five mortality by two –thirds in 2015.

Figure 5. above shows the average of under-five mortality rates per province from (2000-2015).The Free State province still showed a higher average of under-five mortality rates of 95.3 followed by North West (84.6), Northern Cape (60.8), Gauteng province (57.3), Kwa-Zulu-Natal (50.9) and Mpumalanga (50.3). All these provinces reported high annual under-five average compared to other provinces such as the Limpopo (40.0), Western Cape (37.0), and lastly the Eastern Cape Province which reported annual average rate of 34.0.

Substantial progress has been made in reducing child mortality across the provinces, policy interventions and programmes to decline under-five mortality rates across the provinces has been implemented but still South African child mortality rate was higher than other developing countries due to several reasons such as lower coverage of immunisation and PMTCT in rural areas (Rademeyer, 2017). The burden of under-five mortality is mainly caused by four diseases namely pneumonia, diarrhoea, malaria, HIV and AIDS which accounts for more than 40 % of all deaths (Statistics South Africa, 2015).

Most of Under-five deaths are preventable by low-cost and highly effective interventions including immunisations such as oral rehydration solution and anti-malarial. However, coverage for many of these interventions remained very low in several provinces such as the Free State, Eastern Cape and Kwazulu- Natal hence there was a high rate of Under-five mortality in South African provinces including rural areas. Deteriorating health system in the country have resulted in fewer children being vaccinated against childhood disease and that has led to the higher under-five mortality rates in the country. This has been evident in deaths that occurred due to diarrhoea. Diarrhoea has been reported by Chola, Michalow, Tugendhaft & Hofman (2015) to be the leading cause of morbidity and mortality in South African children accounting for 20 % of under-five deaths. The progress for scaling up the interventions to decrease diarrhoea progress has been made by the department of health but the challenge remains (Chola *et al*., 2015).

Chola *et al.,* (2015) mentioned several interventions that were implemented by government to reduce childhood diseases. These include vaccinations against rotavirus, cholera, typhoid and measles, micronutrient supplementation for zinc and vitamin A prevention and treatment of comorbidities such as HIV, exclusive breastfeeding promotion and support, adequate nutrition for mothers and children and lastly the interventions for the provision of water sanitation and hygiene (WASH).

National child mortality rates rose steadily from 1995 peaking around 2006. In 2005 South Africa was one of only four countries in the world where under-five mortality rates was higher than in the 1990 Millennium development Goal (MDG) baseline. The increase was attributed to the deterioration in child health due to HIV & AIDS, which became the largest cause of deaths in children younger than five years. However, between 2006 & 2010 South Africa reduced under-five mortality rates by approximately 40%. Progress on reducing child mortality has occurred due to several policy programmes changes that have improved cover-

age of child health interventions. These include increases in PMTCT, Anti-retroviral therapy (ART) and Immunisation coverage.SA has developed policies, programmes and special committees to prevent childhood morbidity and mortality. In addition, Susuman & Hamisi (2012) points out that other initiatives that were implemented such as the promotion of exclusive breastfeeding for the first few months of the new-born, programmes like vitamin A supplementation and lastly the effective management of childhood diarrhoea. Regardless of the implementation of these initiatives many regions in Sub-Saharan countries did not achieve millennium development goal 4 as these initiatives did not reach out to people who are in need like those who reside in rural areas and in marginalised communities (Susuman & Hamisi,2012).

During the period of 2000-2015 several interventions and policy programmes were implemented in all the provinces to decline or eradicate the high rate of under-five mortality in South Africa. In some provinces the implementation of these interventions was helpful and successful whereas in most provinces the child mortality rate continued to rise. These programmes include the use of Integrated management of childhood illnesses (IMCI) (Statistics South Africa,2015). These policy programmes focused on an improved training programme of primary health-care staff to identify and manage child-illnesses sick children are assessed according to their symptoms and signs. Treatment was given if necessary and the caregiver/ parent is counselled, and or advised on the follow up patient.

It has been reported by several researchers such as Anyamele *et al.,* (2009) that the widespread of under-five mortality have several implications within the countries that are highly affected, It has been found that countries with high rates of child mortality experiences low life expectancy while the countries with low child mortality rates have higher life expectancy. This has been evident in countries such as Nigeria where high under-five mortality rates are the major causes of the low life expectancy (Anyamele *et al.,* 2009). In addition, under-five mortality is more sensible to the change in socioeconomic conditions, under -five mortality captures the impact of poverty on health better than infant mortality (World Bank, 2005). This implies that economic growth probably has a stronger effect on under-five mortality than infant mortality. There is no doubt that lower under-five mortality rates have benefited most people in different provinces as it has important implications for the population growth. Higher levels of child survival imply a higher rate of population growth within a province, on the other hand lower levels of child survival leads to population decline.

Objective 2, Analysis: To estimate the impact of socio-economic variables on under-five mortality in South Africa (N=Mothers=11735; Children 22420).

The second objective of the study was to estimate the impact of socio-economic variables on the under-five mortality in South Africa. The binary logistic regression modelling was carried out for bivariate analyses for both objective two and three. Firstly, the descriptive results will be presented and discussed followed by the results from logistic regression. Bivariate analysis was carried out in order to meet the aims of objective two and three.

Table 4: Socio-economic profile of respondents in South African (N=Mothers=11735; Children 22420).

	Under five mortality			P-Value
	Yes (%)	**No (%)**	**Total (100%)**	
Region				
Western Cape	(11.2%)	(88.8%)	919(100%)	**.000**
Eastern Cape	(12.9%)	(87.1%)	2756(100%)	
Northern Cape	(12.5%)	(87.5%)	1041(100%)	
Free State	(11.9%)	(88.2%)	936(100%)	
Kwazulu-Natal	(12.3%)	(87.7%)	1826(100%)	
North West	(12.0%)	(88.0%)	931(100%)	
Gauteng	(11.8%)	(88.0%)	1057(100%)	
Mpumalanga	(12.8%)	(87.2%)	1131(100%)	
Limpopo Province	(14.3%)	(85.7%)	1138(100%)	
Type of Place of Residence				
Urban	(11.4%)	(88.6%)	6518(100%)	**.000**
Rural	(14.0%)	(86.0%)	5217(100%)	
Mother's Highest Education				
No Education	(23.5%)	(76.5%)	810(100%)	**.000**
Primary	(16.8%)	(83.2%)	3134 (100%)	
Secondary	(9.6%)	(90.4%)	6929(100%)	
Higher	(9.6%)	(90.4%)	862 (100%)	
Respondents' occupational status				
Not Working	(11.4%)	(88.6%)	7693(100%)	**0.000**
Prof Tech managerial	(12.8%)	(87.2%)	563 (100%)	
Clerical	(10.5%)	(89.5)	458 (100%)	

Sales	(13%)	(87 %)	163(100%)
Agric/self-employed	(7.1%)	(92.9%)	5(100%)
Services	(11.3%)	(88.7%)	355(100%)
Skilled manual	(14.7%)	(85.3%)	422(100%)
Unskilled manual	(16.77%)	(83.22%)	2038 (100%)

Data Source; Own Computation from SADHS, 1998

Table 4. Above shows 22420 children of under-five years that were covered in the 1998 SADHS survey from a sample of 11735 women who participated in the SADHS 1998. Table 4. above reveals that under-five mortality varies according to the type of region this has been evident from the table above. Western Cape Province reported the lowest under-five deaths of (11.2%) followed by the Gauteng Province which had (11.8%). However, these were the only provinces that had the lowest under-five mortality some provinces had higher under-five deaths more especially in rural areas such as Limpopo (14.3%) followed by the Eastern Cape (12.9%), Northern Cape (12.5), Kwazulu-Natal (12.3%), North West (12.0%) and lastly Free State which had (11.9 % of child deaths).

Table 4. Above also reveals that under-five mortality also declines according to mothers 'education. Mothers who had no education experienced the highest percentage of (23.5% child deaths) than the ones who had at least primary education (16.8%) secondary (9.6%) and higher education level (9.6%child deaths). Table 4 reveals that the higher the level of education of a mother, the less likely that she would experience a child death. Similarly, under-five deaths decline according to the mother's occupational status the better the occupational status of the mother is the less likely that she would suffer a child death. The table above reported (11.4%) of under-five mortality for the mothers who were not working, then for the children whose mothers were employed as Prof Tech managerial had (12.8%) of under-five mortality. Furthermore, under-five mortality for the children who were born by the mothers who were employed in clerical positions there was (10.5%). Then those children who were born by the mothers who were working in sales position experienced (13%) of under-five mortality. Mothers who were in agriculture self/employed experienced (7.1%) of under-five mortality. Then those who were service providers experienced (11.3%) of under-five mortality. There was (17.7%) of under-five mortality for those children who were born by the mothers who

were in skilled manual. Lastly, there was (16.77%) of under-five mortality for those children who were born by the mothers who were working in unskilled labour.

The results show that there is a high significant relationship between the variables and under-five mortality (p-value=0.000). Table 4. above reveals that mothers who resided in rural areas reported the highest number of deaths of (14%) compared to the ones residing in the urban counterparts who suffered (11.4% child deaths).

Table 5: Case processing summary for objective 2: To estimate the impact of socioeconomic variables.

Case Processing Summary			
Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	22319	99.5
	Missing Cases	101	.5
	Total	22420	100.0
Unselected Cases		0	.0
Total		22420	100.0
a. If weight is in effect, see classification table for the total number of cases.			

The above table 5 shows the number of cases that were included in the analysis, out of the 22 420 cases encountered, 22 319 cases were included in the analysis, 101 were missing. There were 0 unselected cases.

Table 6: Dependent variable encoding

Dependent Variable Encoding	
Original Value	Internal Value
Alive	0
Died	1

As shown above in table 6, the dependent variable was coded as child alive=0, Died =1.

Table 7: Iteration History

Iteration History[a,b,c]			
Iteration		-2 Log likelihood	Coefficients
			Constant
Step 0	1	13867.603	-1.669
	2	12787.336	-2.238
	3	12737.138	-2.395
	4	12736.929	-2.406
	5	12736.929	-2.406
a. Constant is included in the model.			
b. Initial -2 Log Likelihood: 12736.929			
c. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.			

Table 7. Above shows the -2log likelihood and the coefficients of the model as it is shown above the -2log likelihood is 12736.929.

Table 8: Classification Table for objective 2.

Classification Table					
			Predicted		
			U5_mortality		Percentage Correct
	Observed		Alive	Died	
Step 0	U5_mortality	Alive	20473	0	100.0
		Died	1846	0	.0
	Overall Percentage				91.7
a. Constant is included in the model.					
b. The cut value is .500					

The table 8.Above shows that overall, 91.7% percentages of the cases were correctly classified, and hence not all children born will live.

Table 9: Variables in the Equation for objective 2.

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-2.406	.024	9803.038	1	.000	.090

Table 9. above shows more information about the contribution of the predictor variables to the model. The test that is used in this table is wald, the significance column focuses on the values that shows less than 0.5, these are the variables that contribute significantly to the predictive ability of the independent variables to the model. In the above table the significance level is 0.000 which is less than 0.5 this clearly shows that the socio-economic independent variables that were tested have a predictive ability on the under-five mortal.

Table 10: Omnibus Tests-of model coefficients for socio-economic variables.

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	394.035	19	.000
	Block	394.035	19	.000
	Mod-el	394.035	19	.000

The omnibus test of model coefficient shows the overall indication of how well the models perform over. As displayed in the table above the chi-square showed an association of 394.035 at a significance level of (P>0.05). Table above shows the chi-square of 394.035 on a 19 df which is significantly beyond 0.001.

Table 11: Model summary of socioeconomic variables.

Model Summary			
Step	-2 Log like-lihood	Cox & Snell R Square	Nagelkerke R Square
1	12342.894[a]	.017	.040
a. Estimation terminated at iteration number 6 be-cause parameter estimates changed by less than .001.			

Table 11. Above shows the model summary shows that the-2 log likelihood statistic is 12342. 894, this statistic measures how poorly the model predicts the decisions. The smaller the statistic the better the model. The cox & Snell R square values provide an indication of the amount of variation in the dependent variables explained by the model. From table 11 above Cox & Snell R square is 0.017 and Nagelkerke R square is 0.040. This suggests that between 0.017 and 0.040 percent of the variability is explained by the sets of variables in the model.

Table 12: Variables not in the equation for objective two which estimate the impact of socio-economic variables on under-five mortality.

Variables not in the Equation					
			Score	df	Sig.
Step 0	Variables	Region	150.416	8	.000
		Region (1)	62.159	1	.000
		Region (2)	1.298	1	.255
		Region (3)	2.213	1	.137
		Region (4)	.001	1	.975
		Region (5)	6.820	1	.009
		Region (6)	9.188	1	.002
		Region (7)	27.849	1	.000
		Region (8)	7.915	1	.005
		Type of place of residence (1)	68.753	1	.000
		Highest educational level	228.657	3	.000
		Highest educational level (1)	50.596	1	.000
		Highest educational level (2)	117.958	1	.000
		Highest educational level (3)	44.648	1	.000
		Respondent's occupation	85.849	7	.000

		Respondent's occupation (1)	34.681	1	.000
		Respondent's occupation (2)	23.197	1	.000
		Respondent's occupation (3)	5.842	1	.016
		Respondent's occupation (4)	.558	1	.455
		Respondent's occupation (5)	4.060	1	.044
		Respondent's occupation (6)	7.388	1	.007
		Respondent's occupation (7)	8.499	1	.004
	Overall Statistics		372.623	19	.000

Table 12. above shows the covariates that were not in the equation, as it is displayed in the table above highest educational level was reported to have a statistically significant of (P=0.000) than the other variables.

Table 13: Contingency table for Hosmer and Lemeshow Test.

Contingency Table for Hosmer and Lemeshow Test						
		U5_mortality = Alive		U5_mortality = Died		Total
		Observed	Expected	Observed	Expected	
Step 1	1	1364	1361.421	59	61.579	1423

	2	1405	1401.022	71	74.978	1476
	3	1586	1601.180	109	93.820	1695
	4	1379	1387.912	100	91.088	1479
	5	1306	1300.353	87	92.647	1393
	6	1478	1466.595	105	116.405	1583
	7	1378	1375.700	121	123.300	1499
	8	1351	1356.913	149	143.087	1500
	9	1294	1291.750	177	179.250	1471
	10	984	982.153	249	250.847	1233

table 13. above displays the observed and expected numbers of alive children and it also shows the observed and expected number of died children.

Table 14: The effects of socio-economic variables on under-five mortality

Variables in the Equation								95% Confidence Interval	
Covariates.		B	S.E.	Wald	df	Sig.	Exp (B)	**Lower**	**Upper**
Step 1[a]	**Region**			110.795	8	.000			
	Western Cape	1.196	.162	54.631	1	.000	1.932	2.408	4.541
	Eastern Cape	.843	.175	23.223	1	.000	2.537	1.649	3.276
	Northern Cape	.815	.179	20.604	1	.000	2.258	1.589	3.210
	Free State	.931	.165	31.656	1	.000	3.3072	1.834	3.508
	Kwazulu-Natal	.659	.184	12.840	1	.000	3.121	1.348	2.770
	North West	.836	.179	21.760	1	.000	2.308	1.624	3.279
	Gauteng	1.138	.169	45.299	1	.000	2.324	2.241	4.348
	Mpumalanga	.566	.178	10.115	1	.001	1.761	1.243	2.496
	Limpopo Province **RC**								

	Type of place of Residence								
	Urban	.103	.059	3.051	1	.081	1.109	.987	1.244
	Rural **RC**								
	Mother's occupation			16.911	7	.018			
	Not Working	-.410	.201	4.171	1	.041	.718	.447	.984
	Prof,. Tech., Manag	-.536	.218	6.050	1	.014	.585	.382	.897
	Clerical	-.331	.278	1.417	1	.234	.663	.417	1.238
	Sales	1.250	1.102	1.287	1	.257	3.491	.403	30.267
	Agric-self-employed.	-.111	.177	.397	1	.529	.895	.632	1.265
	Agric -employee.	-.136	.146	.860	1	.354	.873	.656	1.163
	Household and domestic.	.088	.058	2.292	1	.130	1.092	.974	1.225
	Services **RC**								

	Highest educational level			123.924	3	.000			
	No education	-.290	.067	18.810	1	.000	.748	.656	.853
	Primary	-.739	.073	102.796	1	.000	.478	.414	.551
	Secondary	-1.203	.203	35.116	1	.000	.300	.202	.447
	Higher **RC**								
	Constant	-2.913	.167	303.823	1	.000	.054		

Source: Author'scomputationfrom1998SADHS

Table 14. Above shows the effects of socio-economic variables on under-five mortality, variables such as the region and the mother's highest educational level were statistically significant however mother's occupational status and type of place of residence did not show statistical significance to the model, they did not show the predictive ability of under-five mortality. Mother's from the Western Cape Province were (OR=1.932) times more likely to experience child deaths at a significant level of (P=0.000). Then the likelihood of the mothers from the Eastern Cape Province to experience under-five mortality was (OR=2.537) at a significant level of (0.000). Mothers from the Northern Cape were (OR=2.258) times more likely to experience under-five mortality, then the likelihood of mothers from Free State Province to experience child deaths was (OR=3.3072) at a significance level of (0.000).Then the odds of mothers from KwaZulu –Natal to experience child deaths was (OR=3.121) at a significance level of (P=0.000). Mothers from the North West province had the likelihood of (OR=2.308) times to experience under-five mortality at a significance level of (P=0.000). For the mothers from Gauteng Province the odds of under-five mortality were (OR=2.324) at a significance level of (P=0.000). Then the likelihood of mothers from Mpumalanga Province to experience under-five mortality was (OR=1.761) times more likely to experience under-five mortality at a significance level of (P=0.000). As displayed in the above table 14. all the provinces showed a statistically significant effect on under-five mortality.

The above findings also revealed that mothers who reside in urban areas were (OR=1.109) times more likely to experience under-five mortality than their counterparts at a significance level of (P=0.081). These results were also consistent with Buwembo (2010) where it was reported that urban areas usually have better infrastructure for health services compared to non-urban areas. They are more developed, as they have access to basic health care provided by government clinics, in some rural counterparts it is not easy to access these services as they are not developed as the people who reside in urban areas. Machado and Hill (2005) revealed that having a mother who lives in the highest developed community reduced the odds of neonatal deaths. They concluded that community infrastructure may improve hygienic practices. Furthermore, these results also reveals that the mother's occupational status also has an impact in influencing under-five mortality even though it was not statistically significant in the model. The odds of children belonging to mothers who were not working to experience under-five mortality were (OR= 0.718) times more likely to die before the age of 5 at a significant level of (P=0.041).Furthermore children belonging to mothers who were em-

ployed as Prof Tech managerial positions were (OR=0.585) at a significance level of (P=0.014). However, children whose mothers were in clerical positions had a likelihood of (OR=0.663) times more likely to die before reaching their fifth birthday at a significant level of (P=0.417). For children belonging to parents who were in sales positions were (OR=3.491) times more likely to die before the age of five years at a significance level of (P=0.257). Then for those children whose mothers were self-employed were (OR=0.895) times more likely to die before the age of five years at a significance level of (P=0.529). Furthermore, the likelihood of children whose parents were employed in agricultural sector were (OR=0.873) times more likely to die before their fifth birthday at a significance level of (P=0.354). For children whose mothers were employed as domestic workers the likelihood of under-five mortality was 0.195 at a significance level of (P=0.569).Then for those children belonging to the mothers working as a household and domestic workers the likelihood of dying before the age of five years was (OR=1.092) at a significance level of (P=0.130).Table 14 above showed that there was no statistical significance between under-five mortality and the mother's occupational status. According to the displayed results in the table above mothers who had no education were (OR=0.748) at a statistical significance level of (P=0.000). However, for the mothers who only obtained primary education their children were (OR=0.478) times more likely to die before the age of five years at a significance level of (P=0.000). Furthermore, the likelihood of the children whose mothers had obtained a secondary education was (OR=0.300) at a significance level (P=0.000). Highest educational level of the mother showed a statistical significance of (P>0.05).

Findings obtained from the present study shows that the mother's highest educational levels have a higher impact on Under-five mortality rates. It has been found that they decrease the risk of under-five mortality among educated mothers. Similar results were found in a study on a role of maternal education in child health from Zimbabwe, where it was reported that the increased level of mother's education helps to reduce the child mortality (Grepin *et al*., 2015). Similarly, another empirical evidence in Turkey shows that maternal education helps to improve the child health by controlling factors such as smoking, decreased fertility and increased age at first birth (Gunes, 2015).The above results were also confirmed by other scholars such as Susuman & Hamisi (2012) that the higher the levels of education of a mother, the less likely that she would suffer a child death. These authors results showed that mothers with no education had 14.6 % of child deaths than the ones who at least obtained primary education. Similarly, Mohammad & Tabassum (2016) also found an inverse relationship

between under-five mortality rates and mother's education; they found that child mortality decreases as mother's education increases. It has therefore been found that under-five mortality is higher among children whose mothers have no education. The results also showed that there was a statistical significance of (P>0.05). Likewise, association between education level of mother and under-five mortality also vary across South Asian countries. Sohail (2017) revealed that lowest level of education or no education of the mother had significantly highest risk for under-five mortality in Nepal in contrast to other South Asian countries. A study from Nepal shows that there is a significant relationship between mother's level of education and breastfeeding practices (Acharya, 2015).

Another significant association was observed between the region and under-five mortality, several scholars agreed with the obtained results that several regions experience more child deaths due to the constraints that hinder the progress of reducing child deaths. Some provinces more especially in the rural areas are more characterised with the low infrastructure, low basic health care which may lead to difficulties of the mother and her child being vaccinated. Table 14. above showed a mixed result of mother's occupational status children belonging to unemployed mothers had a lowest likelihood of dying before the age of five than the ones whose mothers were employed. Children who were born by unemployed mothers were (OR=0.718) times more likely to die before their fifth birthday compared to the ones whose mothers had a better occupational status such as sales. Similar results have been documented by Kishor and Parasuraman (1998) where they found a negative correlation between the mother's employment and the child's survival. It was found that the mother's employment affect the child as she is absent and lives in the urban area, but it may be a different case if the mother works but commutes where the child reside.

Mohammad and Tabassum (2016) also conformed the results that were obtained in the present study. Their results showed a significant association between the covariates such as the region, maternal education, and place of residence on under-five mortality. Their results also suggest that women with higher educational attainment have the lower likelihood of experiencing under-five mortality. Moreover, Mohammad and Tabassum (2016) believe that education could expose mothers to get more knowledge about pregnancy related issues.

Table 15: Demographic characteristics of respondents in South African demographic health survey (N=Mothers=11735; Children 22420).

	Under five mortality			P-Value
	Yes (%)	**No (%)**	**Total (100%)**	
Maternal Age at First Birth				
15-19	(39.8%)	(60.20%)	2373(100%)	**0.000**
20-24	(5.3%)	(94.7%)	2086(100%)	
25-29	(10.9%)	(89.1%)	1811(100%)	
30-34	(16.6%)	(83.4%)	1616 (100%)	
35-39	(21.4%)	(78.6%)	1628 (100%)	
40-44	(22.3%)	(77.7%)	1255(100%)	
45-49	(24.8%)	**(**75.2%)	966(100%)	
Sex of the Chid Male	(8.9 %)	(91.1%)	11394(100%)	**0.000**
Female	(7.5%)	(92.5%)	11026(100%)	
Birth Order Number				
1	(8.0%)	(92.0%)	7979(100%)	**0.000**
2	(7.6%)	(92.4%)	5622(100%)	
3	(7.6%)	(92.4%)	3628(100%)	
4	(9.7%)	(90.3%)	2256(100%)	
5	(9%)	(91%)	134(100%)	
6	(8.8%)	(91.2%)	774(100%)	
7	(11.7%)	(88.3%)	401 (100%)	
8	(11.1%)	(88.9%)	207 (100%)	
9	(9.2%)	(90.8%)	109 (100%)	
10	(16.1%)	(83.9%)	62 (100%)	
11	(20.0%)	(80.0%)	25 (100%)	
12	(100%	(0.0%)	7 (100%)	
13	(80.0%)	(20.0)	5 (100%)	
14	(100%)	(0.0%)	1 (100%)	
Birth Interval ≥ 4 Years				
No	(16.2%)	(83.2%)	(100%)	**0.000**
Yes	(6.8%)	(93.2%)	(100%)	

***P<0.001**

Data Source; Own computation from SADHS,1998

Table 15. above shows 22420 children of under-five years that were covered in the survey from a sample of 11735 women who participated in the SADHS 1998.

Results of the bivariate analysis to assess the significant unadjusted effects of the demographic variables on under-five mortality showed that all the variables are significantly associated with under-five mortality (P = 0.000). Child mortality was higher for mothers who were under 20 years 15-19 (39.8%) and 45-49 (25.8%). However results reveals that mothers aged 25-29 experienced the lowest under-five deaths of (5.3%).Under-five was also lowest for mothers who were 25-29 years old (10.9% of child deaths) compared to the ones who were aged 30-34 years old who suffered (16.6%) of child deaths and those who were 35-39 years old who experienced (21.4%) of child deaths. Sex of the child also showed statistical significance of =P>0.000. The highest under-five mortality rate was reported among the males than females. Table 15. above reveals that 8.9% of males were more likely to die before reaching their fifth birthday. Then females reported 7.5% of under-five mortality.

As depicted in the table above, it is evident that mortality increases as the birth order number increases, children younger than the age of five years in the first ranked birth order reported (8%) of deaths, then those who were in the second birth order there was 7.6 % of under-five mortality similarly to those who were in the third birth order number. There was 7.6 % of under-five mortality. Children who were in the fourth ranked birth order number had (9.7%) of under-five mortality, then the fifth ones experienced (9%) of under-five mortality. Then those who were in the sixth birth order number there was (8.8%) of children dying before the age of five. For the seventh ranked birth order number there was (11.7%) of under-five mortality. For those children born at the eight-birth order number (11.1%) of under-five mortality was reported. For those children born in the ninth birth order number there was (9.2%) of children died before the age of five. Then those children born in the tenth ranked birth order number 16.1% of under-five mortality was reported. For those who were born in the eleventh birth order number (20%) of under-five mortality was reported. For the children born in the twelve-birth order number under-five mortality rate was (100%). The table above reveals under-five mortality rate of (80%) for the children born in the 13^{th} ranked birth order number. Lastly for those who were in the 14^{th} birth order number (100%) of under-five mortality was reported.

Table 16: Case processing Summary.

Case Processing Summary			
Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	14752	65.8
	Missing Cases	7668	34.2
	Total	22420	100.0
Unselected Cases		0	.0
Total		22420	100.0
a. If weight is in effect, see classification table for the total number of cases.			

The above table 16. shows the number of cases that were included in the analysis, as it is displayed that there were 14752 cases that were included and 7668 were the missing ones And the total number of cases was 22420.

Table 17: Dependent variable coding.

Dependent Variable Encoding	
Original Value	Internal Value
Alive	0
Died	1

The above table shows how the dependent variable has been coded, children who were alive were coded as 0 and those who died are coded as 1.

Categorical codings of objective 3 (see appendix 3)

Table 18: Iteration History

Iteration History[a,b,c]			
Iteration		-2 Log likelihood	Coefficients Constant
Step 0	1	9193.016	-1.667
	2	8484.327	-2.233
	3	8451.746	-2.389
	4	8451.614	-2.400
	5	8451.614	-2.400
a. Constant is included in the model.			
b. Initial -2 Log Likelihood: 8451.614			
c. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.			

Table 19: Classification Table.

Classification Table[a,b]					
	Observed		Predicted		
			U5_mortality		Percentage Correct
			Alive	Died	
Step 0	U5_mortality	Alive	13525	0	100.0
		Died	1227	0	.0
	Overall Percentage				91.7
a. Constant is included in the model.					
b. The cut value is .500					

Table 19 .above shows the overall percentage of classified cases, in the above table the model correctly classified 91.7% of cases overall.

Table 20: Variables in the Equation.

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-2.400	.030	6479.503	1	.000	.091

Table 20. above illustrate more information about the contribution of the predictor variables to the model. The test that is used in this table is wald, the significance column focuses on the values that shows less than 0.5, these are the variables that contribute significantly to the predictive ability of the independent variables to the model. In the above table the significance level is 0.000 which is less than 0.5 this clearly shows that the demographic independent variables that were tested have a predictive ability on the under-five mortality.

Table 21: Variables not in the equation.

Variables not in the Equation					
			Score	df	Sig.
Step 0	Variables	Age 5-year groups	84.945	6	.000
		Age 5-year groups(1)	3.595	1	.058
		Age 5-year groups(2)	9.300	1	.002
		Age 5-year groups(3)	21.176	1	.000
		Age 5-year groups(4)	6.580	1	.010
		Age 5-year groups(5)	6.540	1	.011
		Age 5-year groups(6)	57.438	1	.000

		Sex of child(1)	14.801	1	.000
		Birth interval >= 4 years	277.662	2	.000
		Birth interval >= 4 years(1)	245.321	1	.000
		Birth interval >= 4 years(2)	70.715	1	.000
		Birth order number	33.287	13	.002
		Birth order number(1)	5.913	1	.015
		Birth order number(2)	3.181	1	.075
		Birth order number(3)	6.324	1	.012
		Birth order number(4)	.911	1	.340
		Birth order number(5)	.235	1	.628
		Birth order number(6)	6.260	1	.012
		Birth order number(7)	2.149	1	.143
		Birth order number(8)	.106	1	.745
		Birth order number(9)	4.982	1	.026
		Birth order number(10)	4.482	1	.034
		Birth order number(11)	.635	1	.425
		Birth order number(12)	.895	1	.344
		Birth order number(13)	.091	1	.763
	Overall Statistics		381.987	22	.000

The above table 21 shows the covariates that were not in the equation, as it is displayed in the table above that sex of the child and the birth interval were statistically significant (P=0.000) than the other variables such as the birth order number.

Table 22: Omnibus tests of model coefficients for objective 3

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	320.073	22	.000
	Block	320.073	22	.000
	Mod-el	320.073	22	.000

Table 22 above shows the omnibus tests of model coefficients, it shows the chi-square of 320.073 at a significance level of P=0.000. As displayed in the table above the chi-square showed an association of 320.073 at a significance level of (P>0.000). The table above shows the chi-square of 320.073 on a 22 df which is significantly beyond 0.001.

Table 23: Model summary for Objective 3.

Model Summary			
Step	-2 Log likeli-hood	Cox & Snell R Square	Nagelkerke R Square
1	8131.541[a]	.021	.049
a. Estimation terminated at iteration number 20 because maximum iterations has been reached.			

Table 23 above gives more information about the usefulness of the model. The Cox & Snell R square values provide an indication of the amount of variation in the dependent variables explained by the model. From table above Cox & Snell R square is 0.21 and Nagelkerke R square is 0.049. This suggests that between 0.21 and 0.049 percent of the variability is explained by the sets of variables in the model.

Table 24: Hosmer and Lemeshow Test.

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	5.805	8	.669

The table above supports the model as being worthwhile, according to SPSS this is the most reliable test of model fit available. For Hosmer and Lemeshow goodness of fit test poor fit is indicated by a significance value that is greater than 0.05, if the significance value is less than 0.05 then it clearly shows that goodness of fit test is poor. In the above table 26 the chi-square value for Hosmer and Lemeshow is 5.805 with a significance level of 0.669 which is greater than 0.05. These values indicate the support for the model.

Table 25: Contingency table for Hosmer and Lemeshow test.

Contingency Table for Hosmer and Lemeshow Test						
		U5_mortality = Alive		U5_mortality = Died		Total
		Observed	Expected	Observed	Expected	
Step 1	1	1364	1361.421	59	61.579	1423
	2	1405	1401.022	71	74.978	1476
	3	1586	1601.180	109	93.820	1695
	4	1379	1387.912	100	91.088	1479
	5	1306	1300.353	87	92.647	1393
	6	1478	1466.595	105	116.405	1583
	7	1378	1375.700	121	123.300	1499
	8	1351	1356.913	149	143.087	1500
	9	1294	1291.750	177	179.250	1471
	10	984	982.153	249	250.847	1233

The above table 25. displays the observed and expected numbers of alive children and it also shows the observed and expected number of died children.

Table 26: Effects of demographic variables on under-five mortality.

Variables in the Equation									
Covariates		B	S.E.	Wald	Df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Age 5-year groups			56.466	6	.000			
	15-19	-.632	.778	.660	1	.416	.566	.116	2.441
	20-24	-.570	.762	.560	1	.454	.531	.127	2.516
	25-29	-.617	.759	.661	1	.416	.540	.122	2.387
	30-34	-.427	.757	.319	1	.572	.652	.148	2.876
	35-39	-.183	.757	.059	1	.809	.833	.189	3.671
	40-44	.014	.757	.045	1	.000	1.014	.230	4.471
	45-49 **RC**								
	Birth interval >= 4 years			233.464	2	.000			
	Birth interval >= 4 years No Yes **RC**	-.963	.070	190.491	1	.000	.382	.333	.438
	Birth order number			14.721	13	.325			
	Birth order number(1)	.491	.241	4.164	1	.041	1.634	1.020	2.619
	Birth order number(2)	.434	.244	3.166	1	.075	1.544	.957	2.492
	Birth order number(3)	.631	.247	6.525	1	.011	1.880	1.158	3.050
	Birth order number(4)	.493	.255	3.724	1	.054	1.637	.992	2.701
	Birth order number(5)	.401	.269	2.218	1	.136	1.493	.881	2.531
	Birth order number(6)	.707	.285	6.164	1	.013	2.027	1.160	3.541
	Birth order number(7)	.620	.327	3.594	1	.058	1.859	.979	3.529

	Birth order number(8)	.271	.413	.431	1	.511	1.311	.584	2.944	\
	Birth order number(9)	.877	.426	4.229	1	.040	2.403	1.042	5.540	
	Birth order number(10)	1.143	.571	4.012	1	.045	3.137	1.025	9.601	
	Birth order number(11)	-19.182	14622.072	.000	1	.999	.000	.000	.	
	Birth order number(12)	1.172	1.170	1.004	1	.316	3.229	.326	31.973	
	Birth order number(13)	-18.294	40192.970	.002	1	1.000	.000	.000	.	
	Birth Order number(14) **RC**									
	Sex of the child Male Female **RC**	-.236	.061	15.021	1	.000	.790	.701	.890	
	Constant	-1.724	.785	4.818	1	.028	.178			
a. Variable(s) entered on step 1: Age 5-year groups, Sex of child, Birth interval >= 4 years, Birth order number.										

Source: Author's computation from 1998 SADHS

The above table 26 shows the results of logistic regression testing of the significant independent effects of the demographic variables on under-five mortality. All the variables indicated significant independent effects on under-five mortality except the birth order. The likelihood of males to experience under-five mortality is (OR=0.796) at a significance level of (P=0.000). Then the odds of under-five mortality for children whose birth interval was not>=4years is (OR=-.944) at a significance level of (P=0.000) than the ones in their counterparts. Then mothers who were aged 15-19 were (OR=0.566) times more likely to experience under-five mortality and they were not statistically significant (P=0.416).Then for the mothers who were aged 20-24 the odds of child deaths were (OR=0.531) at a significance level of (P=0.454).Then for those children who were born by the mothers who were between the ages of 25-29 the odds of under-five were (were (OR=0.540) at a significance level of (0.416) this age did not show any statistical significance. For the mothers aged 30-34 the likelihood of under-five mortality was (OR=0.652) at a significance level of (P=0.572). Children born to a mothers between30 and 39 years of age have the least risk of dying before age five for the mothers who were aged 35-39 the likelihood of under-five mortality was (OR=0.833) at a significance level of (P=0.809).

Then mothers who were aged 40-44 years were (OR=1.014) times more likely for their children to die before they can reach their fifth birthday at a significance level of (P=0.000). However, the results displayed in the table above for this age category were not statistically significant. The results obtained in the present study were consistent with the results obtained in a study by Ribeiro *et al.,* (2014). This author's results showed the likelihood of under-five mortality among older women aged (45-49) as compared to the women of the younger age. He found that as the age increases, the risk of under-five mortality also increases. However, an association was found for the younger age group of (15-19) and increased risk of under-five mortality compared to (20-24) year's age group. These results also conform to the work of Ahimbisiwe (1997) Who argued that mothers who were above the reproductive ages of (40-49) and adolescents were more likely to give birth to underweight children and that may lead to the risk of child deaths .This is supported by the researchers such as Ogada (2014) who argued that a very young mother is not biologically matured to support pregnancy related complications hence there may be high probability of under-five mortality.

A similar study by Nazrul *et al*., (2009) agreed with the obtained results that the mother's age at birth had a significant effect on child mortality it was revealed that very low or very high age at first birth was associated with the highest risk of child mortality. Similarly, Ahonsi

(1995) found that the highest risk of child mortality was higher among teenage mothers compared to those mothers who were 20 years and above.

Among the biological and maternal factors birth interval was also one of the variables that showed a statistically significant in the model. Mothers who experienced a birth interval of >=4 years were (OR-0.382) times more likely to experience under-five mortality at a significance level of (P=0.000). Furthermore, birth order number did not show a statistically significant in the modelling. The results also show that birth order also have an impact in influencing under-five mortality even though the results were not statistically significant. The likelihood of dying before the fifth birthday for the first born is (OR=1.634) at a significant level of (P=0.41). However, the second born were (OR=1.544) times more likely to die before the age of five at a significant level of (P=0.075), then the likelihood of the third born to die before they could reach their fifth birthday was (OR=1.880) at a significant level (P=0.011). Then the probability of the fourth child to die before the age of five is (OR=1.637 at a significant level of (P=0.054). The fifth child was (OR=1.493) times more likely before they could even reach their fifth birthday at a significance level of (OR=0.136). Then the probability of the sixth child to die before the age of five was (OR =2.027) at a significant level of (P=0.013).

Then the likelihood of those children who were in the seventh birth order to die before the age of five is (OR=1.859) at a significant level of (P=0.058). Then the likelihood of dying before the age of five for the eight children was (OR=1.311) at a significant level of (P=0.511). The results also reveal that the probability of the ninth child to die before the fifth birthday is (OR=2.403) at a significant level of (P=0.040). Then the likelihood of a tenth child to die before the fifth birthday is (OR=3.137) at a significant level of (P=0.000). Then for those children who were in the eleventh birth order the possibility of dying before the age of five was (OR=0.000) at a significant level of (P=0.999).Furthermore the odds of children in twelfth birth order was (OR=3.229) at a significance level of (P=0.316), lastly for the 13th birth order the likelihood of dying before the age of five is (OR=0.000) at a significant level of (1.000). From the results displayed in the table above it has been shown that sex of the child also showed a statistical significance. It was reported that males were (OR=0.790) times more likely to die before the age of five than their counterparts at a significance level of (P=0.000).

Similar results have been documented by several scholars such as Buwembo (2010) where they have demonstrated that increased mortality risks among children born after short birth intervals. Gbemisola (2016) obtained similar results to the present study, as he found that birth interval was one of the key determinants of child survival. He found that birth interval exerts its impact on child mortality through the mechanisms of breastfeeding. Birth spacing of at least 36 months has been found to reduce childhood deaths. It was also found that children of the fourth or higher birth order were more susceptible to diseases hence the above table displayed higher odds of child deaths for the children of fourth to thirteenth birth order. Furthermore, it was revealed that the fourth or later children are 6.6 more likely to die before the age of five compared to the first-born child (Buwembo,2010). The results of the present study though showed that there was no statistical significance between the birth order number and under-five mortality.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 Summary and conclusion

The present chapter encapsulate the discussion of the results and conclusion based on the three objectives that the study aimed to achieve, and it will also integrate with the existing body of the literature. The main purpose of this chapter is to give the meaning of the results portrayed in chapter 5 and provide a summary of the results that were obtained as well. In addition, this chapter also explains how the factors that were examined explains the occurrence of under-five mortality in South Africa.

For objective 1, the study compared the levels of under-five mortality in South Africa across the provinces from 2000-2015. The findings of the study indicated a great deal of variations of under-five mortality across the provinces during the period under consideration. The highest rate of mortality was reported in the poorer provinces with Free State being the one that reported the highest rate of mortality throughout the years. The variations among the provinces were attributed to socio-economic status of each province. In addition, this is due to the provinces that are still currently suffering from poor healthcare delivery system in the rural areas and the scarcity and negative attitude of health professionals towards the community. It is apparent from the present results of the study that rural provinces such as Free State, Limpopo Province, Kwazulu-Natal and the Eastern Cape Province had the highest rates of under-five mortality. The highest rates of under-five mortality among children under the age of five years in these regions is attributed to possible determinants such as maternal age, HIV/AIDS, occupational status and lastly the region of residence.

For Objective 2, the study has examined the effects of socio-economic determinants of under-five mortality in South Africa. The variables examined were such as maternal education, type of place of residence, region and the mother's occupational status. Objective 3 in the study examined the impact of demographic variables on under-five mortality. Demographic variables that were examined included mother's age at first birth, birth order number, birth interval and lastly the sex of the child. As displayed in the results in previous chapter not all the variables showed a statistical significance in the logistic regression model. For objective 2 variables such as mother's occupation status, type of place of residence, birth order number did not show any statistical significance or predictive ability on under-five mortality. While objective 3 variables such as birth interval, region, mother's highest educational level and mother's age at first birth were statistically significant in the modelling. The findings that

were obtained in the present study were not consistent with the findings of Ogada (2014) ,where it was found that under-five mortality was more prevalent among the mothers who were between the age of 35 -40 years than the mothers who were between the age of 20-34 years in cities of East Africa. However Buwembo (2010) conformed to the findings of the present study, he identified age as significant determinant of under-five mortality. He argued that under-five children born to mothers in ages less than 20 years were more likely to die than the mothers who are between the ages of 20-25 years.

6.2 Scientific contribution of the study

The study has brought to light key policy implications which government needs to focus on. The empowerment of women through education should be encouraged because mother's education continues to influence under-five mortality.

The results presented in chapter 5 showcases the importance of investing and encouraging young women to be educated and the study confirms that education plays a significant role in determining under-five mortality.

1. Education has therefore been indicated as the most significant variable that influences the child survival hence initiatives and interventions need to focus on revising policies that are aimed at promoting the level of education.
2. The results also showcase that child health disparities vary according to the region, this has been evident in the results above that highlighted inequalities still exists in the provinces. Some provinces experienced high under-five mortality rates due to the lack of proper infrastructure and poor healthcare.
3. Moreover, the study will influence the department of Health to encourage young women to use contraceptives as the birth interval also indicated predictive ability of under-five mortality.

6.3 Policy recommendations

In order to reduce the high rate of under-five mortality there is a need to implement new policy interventions or step up the effectiveness of the existing interventions that aims to reduce under-five child deaths. Greater efforts, resources and funding should be committed to the intervention programmes that aim to reduce the expansion of under-five mortality rates. The present study recommends that greater efforts should be done on improving maternal health care delivery with great emphasis on proper dietary practises among pregnant women to reduce the number of underweight new-borns. Furthermore, it is also recommended that efforts

are also needed to extend educational programs aimed at educating pregnant women on the benefits of breastfeeding during the first few months after childbirth.

As it is shown in chapter 5 that birth interval also showed a statistical significance to the model, it is obvious that there is a need for the policies that can influence mothers to limit the frequency of births through contraceptives for at least for a maximum period of 36 months (three years) to decline the high rate of under-five mortality in South Africa. That can give the mothers enough time to bond with their new-borns and have enough time to breastfeed as it has been shown in the literature that birth interval exert its impact through the mechanisms or pathways of breastfeeding.

Moreover, interventions that aims to promote the quality of education that is beyond primary and secondary level needs to be implemented with great emphasis on the importance of encouraging all children to go to school more particularly young girls. As it has been documented by the present study that under-five mortality rates decreases as the mother's level of education increases. This could reduce early marriage and empower young mothers with both the knowledge and means to provide the best quality of care to their new-borns.

It has been evident from the presented results in chapter 5 that education varies according to the mothers' level of education; mothers who obtained tertiary education had lower rates of under-five mortality. However, the ones who only obtained primary and secondary education had high levels of under-five mortality.

Based on the results portrayed in chapter 5 and the discussions carried out, greater efforts and resources that facilitates adequate intervention programmes that aims to reduce the expansion of childhood mortality need to be implemented. These programmes should reach out to the majority of mothers whose infants are more susceptible to deaths, born to older mothers aged (40-49 years). Also, more efforts should be implemented within the rural areas and with the urban poor, less educated, HIV positive individuals, and professionals. Also, there is a need to step up the existing interventions that aim to reduce the expansion of under-five mortality, for instance the implementation of PMTCT was not successful in other regions due to several reasons such as the lack of health professionals. Emphasis should be put on the exclusive breastfeeding as it has been revealed that the milk of the mother has the nutrients that may protect the child from numerous diseases. Finally immunisation interventions should be stepped up in order to protect the children younger than the age of five from diseases such as measles, cholera and diarrhoea.

There should be sufficient and easy access to children's health information including the promotion of good food hygiene and storage practices throughout the region. Therefore, there is a need to improve women's socio-economic status through education in order to help improve women's access to nutritional food for children and health care services. There is also need for continued support and promotion of child spacing through family planning programmes, especially more than two years preceding birth interval in order to improve child survival in the region.

Also, there is a need in improving the current registration system which is vital as it is difficult to implement policies that aim to reduce under-five mortality when there is a lack of reliable data as it makes it difficult to track child mortality at a country and provincial level. According to You *et al.*, (2015) insufficient data estimates of child mortality are delaying the development and implementation of equity-focused strategies and interventions at a national, provincial and district level.

6.4 Reflection and implications of the study findings for current theory

The framework by Mosley and Chen (1984) is the framework used in the present study to explain the role of socio-economic and demographic determinants of under-five mortality. This framework shows the pathways of how demographic and socioeconomic variables influence one another in order to cause the outcome of child death. According to this framework socio-economic variable operates through the sets of proximate determinants which leads to the possibility or risk of diseases which may eventually cause child deaths. The framework of Mosley and Chen,1984 was chosen to guide the present study as it gives in-depth explanation of how demographic and socio-economic variables influences one another and eventually lead to the final event which is death. This study confirms the theory of Mosley and Chen(1984) in explaining that socio-economic and demographic factors act through the proximate determinants such as maternal factors to influence under-five mortality in South Africa.

6.5 Reflections on Methodological Issues

According to the results obtained in the study, there is a need for government to step up the existing policy interventions to reduce the upsurge of under-five mortality in disadvantaged areas of the country. Descriptive statistics like any other analytical technique it has several limitations. The first one is that there is a high risk of distorting the original data as well as losing important details when describing a large set of observations with just a single indicator. Furthermore descriptive statistics provide a powerful summary that may enable comparisons across people or other units.

According to the results based on 1998 SADHS, it is evident that certain socio-economic inequalities still exists, and the most vulnerable mothers reside in the most disadvantaged areas of the country such as the rural areas.

6.6 Limitations of the study

A minimum research has been conducted on the socio-economic and demographic determinants of under-five mortality in South Africa and an extensive research focusing on HIV and Aids as the determinant of under-five mortality would need to occur. The impact of socio-economic and demographic factors has been ignored. Moreover, Due to the unavailability of 2016 SADHS data sets and the poor-quality of 2003 SADHS this study utilises the secondary data which is available for the 1998 South African demographic and health survey dataset for women and children. The datasets for 2003 SADHS were not made available to the public domain due to the inadequate quality and it was only report that was available when this research was conducted. The dataset for the recent survey of 2016 was not released hence the use of 1998 SADHS, as it was only the report that was available to the public domain when this study was conducted. The other datasets such as the general household survey and community survey were not employed in the present study since they do not focus on maternal health issues and reproductive issues.

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Appendices

Appendix 1. The Cut Value is .50

Symbols: A - Alive

D - Died

Each Symbol Represents 200 Cases.

Casewise List[b]							
Case	Selected Status[a]	Observed	Predicted	Predicted Group	Temporary Variable		
		U5_mortality			Resid	ZResid	SResid
44	S	D**	.018	A	.982	7.325	2.831
313	S	D**	.025	A	.975	6.209	2.713
375	S	D**	.025	A	.975	6.209	2.713
378	S	D**	.042	A	.958	4.747	2.515
474	S	D**	.039	A	.961	4.962	2.548
486	S	D**	.028	A	.972	5.941	2.681
585	S	D**	.047	A	.953	4.509	2.475
624	S	D**	.079	A	.921	3.414	2.253
625	S	D**	.079	A	.921	3.414	2.253
698	S	D**	.079	A	.921	3.414	2.253
708	S	D**	.079	A	.921	3.414	2.253
743	S	D**	.054	A	.946	4.192	2.420
759	S	D**	.118	A	.882	2.728	2.066

772	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
782	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
798	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
799	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
817	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
819	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
842	**S**	**D****	**.070**	**A**	**.930**	**3.654**	**2.310**
891	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
893	**S**	**D****	**.070**	**A**	**.930**	**3.654**	**2.310**
918	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
920	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
927	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
942	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
967	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1063	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
1072	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
1098	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
1118	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1198	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1211	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1219	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1231	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**

1260	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
1278	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1356	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
1357	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
1364	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
1390	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
1391	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
1416	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
1435	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
1444	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
1548	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1574	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1712	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1723	**S**	**D****	**.056**	**A**	**.944**	**4.090**	**2.400**
1729	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1730	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1764	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1766	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1767	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1771	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1810	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1816	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**

1877	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1879	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1882	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1889	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1913	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1937	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
1964	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1976	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
1990	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2000	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
2001	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2008	**S**	**D****	**.118**	**A**	**.882**	**2.740**	**2.073**
2040	**S**	**D****	**.051**	**A**	**.949**	**4.306**	**2.441**
2057	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
2063	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2065	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2088	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2102	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2103	**S**	**D****	**.115**	**A**	**.885**	**2.773**	**2.082**
2109	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2130	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2134	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**

2135	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2152	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2153	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
2176	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2177	**S**	**D****	**.078**	**A**	**.922**	**3.429**	**2.259**
2232	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2255	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2275	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
2288	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
2289	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2290	**S**	**D****	**.053**	**A**	**.947**	**4.240**	**2.429**
2320	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2339	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
2347	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
2349	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
2360	**S**	**D****	**.118**	**A**	**.882**	**2.740**	**2.073**
2364	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
2401	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2409	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2427	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
2432	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
2440	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**

2444	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
2450	**S**	**D****	**.077**	**A**	**.923**	**3.470**	**2.268**
2532	**S**	**D****	**.050**	**A**	**.950**	**4.358**	**2.449**
2546	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
2551	**S**	**D****	**.034**	**A**	**.966**	**5.325**	**2.602**
2559	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
2565	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
2605	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
2610	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
2684	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
2698	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
2701	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
2702	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
2715	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
2719	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
2728	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
2736	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
2812	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
2814	**S**	**D****	**.093**	**A**	**.907**	**3.114**	**2.178**
2816	**S**	**D****	**.093**	**A**	**.907**	**3.114**	**2.178**
2817	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
2946	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**

2969	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
2971	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
3000	**S**	**D****	**.093**	**A**	**.907**	**3.114**	**2.178**
3010	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
3015	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
3029	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
3030	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
3033	**S**	**D****	**.063**	**A**	**.937**	**3.868**	**2.355**
3038	**S**	**D****	**.063**	**A**	**.937**	**3.868**	**2.355**
3065	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
3103	**S**	**D****	**.123**	**A**	**.877**	**2.673**	**2.049**
3106	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
3110	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
3167	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
3172	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
3175	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
3180	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
3241	**S**	**D****	**.040**	**A**	**.960**	**4.874**	**2.538**
3242	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
3265	**S**	**D****	**.033**	**A**	**.967**	**5.402**	**2.613**
3270	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
3290	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**

3350	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
3359	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
3368	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
3374	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
3378	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
3404	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
3421	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
3439	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
3440	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
3449	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
3452	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
3556	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
3560	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
3636	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
3655	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
3711	**S**	**D****	**.092**	**A**	**.908**	**3.136**	**2.184**
3744	**S**	**D****	**.054**	**A**	**.946**	**4.200**	**2.421**
3748	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
3752	**S**	**D****	**.092**	**A**	**.908**	**3.136**	**2.184**
3764	**S**	**D****	**.061**	**A**	**.939**	**3.924**	**2.366**
3812	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
3826	**S**	**D****	**.129**	**A**	**.871**	**2.595**	**2.024**

3833	**S**	**D****	**.129**	**A**	**.871**	**2.595**	**2.024**
3883	**S**	**D****	**.092**	**A**	**.908**	**3.136**	**2.184**
4053	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4061	**S**	**D****	**.037**	**A**	**.963**	**5.097**	**2.569**
4071	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
4099	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
4120	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
4144	**S**	**D****	**.045**	**A**	**.955**	**4.599**	**2.493**
4145	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
4176	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4211	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4247	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
4266	**S**	**D****	**.027**	**A**	**.973**	**6.037**	**2.693**
4274	**S**	**D****	**.131**	**A**	**.869**	**2.578**	**2.018**
4318	**S**	**D****	**.083**	**A**	**.917**	**3.334**	**2.236**
4329	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
4407	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4413	**S**	**D****	**.027**	**A**	**.973**	**6.037**	**2.693**
4426	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4427	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
4449	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
4475	**S**	**D****	**.040**	**A**	**.960**	**4.917**	**2.542**

4487	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4522	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4535	**S**	**D****	**.027**	**A**	**.973**	**6.037**	**2.693**
4545	**S**	**D****	**.083**	**A**	**.917**	**3.334**	**2.236**
4549	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4560	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
4563	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4587	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4600	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
4608	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
4611	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
4630	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
4650	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
4664	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
4685	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
4706	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
4708	**S**	**D****	**.040**	**A**	**.960**	**4.917**	**2.542**
4724	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4754	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
4759	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
4763	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**
4792	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**

4833	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
4845	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
4854	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
4896	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
4937	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
4945	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
4953	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
4959	**S**	**D****	**.091**	**A**	**.909**	**3.166**	**2.193**
4961	**S**	**D****	**.060**	**A**	**.940**	**3.962**	**2.375**
5031	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
5038	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
5040	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
5050	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
5060	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
5078	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
5090	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
5094	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
5095	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
5096	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
5122	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**
5135	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**
5143	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**

5147	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
5149	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
5153	**S**	**D****	**.074**	**A**	**.926**	**3.543**	**2.284**
5186	**S**	**D****	**.028**	**A**	**.972**	**5.841**	**2.670**
5202	**S**	**D****	**.079**	**A**	**.921**	**3.415**	**2.254**
5208	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
5245	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
5252	**S**	**D****	**.032**	**A**	**.968**	**5.485**	**2.624**
5293	**S**	**D****	**.048**	**A**	**.952**	**4.467**	**2.467**
5305	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
5306	**S**	**D****	**.079**	**A**	**.921**	**3.415**	**2.254**
5314	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
5315	**S**	**D****	**.079**	**A**	**.921**	**3.415**	**2.254**
5324	**S**	**D****	**.048**	**A**	**.952**	**4.467**	**2.467**
5356	**S**	**D****	**.048**	**A**	**.952**	**4.467**	**2.467**
5385	**S**	**D****	**.052**	**A**	**.948**	**4.274**	**2.433**
5407	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
5409	**S**	**D****	**.048**	**A**	**.952**	**4.467**	**2.467**
5410	**S**	**D****	**.048**	**A**	**.952**	**4.467**	**2.467**
5472	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
5474	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
5487	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**

5508	**S**	**D****	**.057**	**A**	**.943**	**4.059**	**2.393**
5516	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**
5527	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
5589	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
5590	**S**	**D****	**.113**	**A**	**.887**	**2.805**	**2.091**
5598	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
5603	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**
5613	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
5621	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**
5652	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
5678	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**
5698	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**
5701	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
5780	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
5786	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**
5854	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
5858	**S**	**D****	**.034**	**A**	**.966**	**5.344**	**2.605**
5889	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
5896	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
5898	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
5901	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
5910	**S**	**D****	**.076**	**A**	**.924**	**3.495**	**2.275**

6045	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
6086	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
6096	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
6113	**S**	**D****	**.050**	**A**	**.950**	**4.374**	**2.452**
6155	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
6174	**S**	**D****	**.024**	**A**	**.976**	**6.329**	**2.727**
6228	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
6229	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
6237	**S**	**D****	**.111**	**A**	**.889**	**2.825**	**2.096**
6241	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
6242	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
6278	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
6341	**S**	**D****	**.050**	**A**	**.950**	**4.374**	**2.452**
6363	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
6376	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
6385	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
6425	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
6431	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
6440	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
6446	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
6479	**S**	**D****	**.051**	**A**	**.949**	**4.322**	**2.443**
6509	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**

6523	**S**	**D****	**.034**	**A**	**.966**	**5.344**	**2.605**
6528	**S**	**D****	**.036**	**A**	**.964**	**5.155**	**2.578**
6544	**S**	**D****	**.111**	**A**	**.889**	**2.825**	**2.096**
6603	**S**	**D****	**.075**	**A**	**.925**	**3.514**	**2.277**
6606	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
6662	**S**	**D****	**.075**	**A**	**.925**	**3.514**	**2.277**
6699	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
6766	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
6767	**S**	**D****	**.081**	**A**	**.919**	**3.363**	**2.241**
6770	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
6798	**S**	**D****	**.048**	**A**	**.952**	**4.432**	**2.463**
6841	**S**	**D****	**.075**	**A**	**.925**	**3.514**	**2.277**
6842	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
6847	**S**	**D****	**.075**	**A**	**.925**	**3.514**	**2.277**
6893	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
6899	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
6900	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
6915	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
6930	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
6934	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
6944	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
6953	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**

6989	**S**	**D****	**.112**	**A**	**.888**	**2.820**	**2.098**
6999	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
7028	**S**	**D****	**.089**	**A**	**.911**	**3.194**	**2.199**
7141	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
7185	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
7191	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
7221	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
7230	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
7279	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
7288	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
7291	**S**	**D****	**.089**	**A**	**.911**	**3.194**	**2.199**
7302	**S**	**D****	**.089**	**A**	**.911**	**3.194**	**2.199**
7311	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
7313	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
7325	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
7331	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
7377	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
7408	**S**	**D****	**.044**	**A**	**.956**	**4.679**	**2.503**
7428	**S**	**D****	**.048**	**A**	**.952**	**4.477**	**2.469**
7430	**S**	**D****	**.044**	**A**	**.956**	**4.679**	**2.503**
7436	**S**	**D****	**.026**	**A**	**.974**	**6.118**	**2.703**
7438	**S**	**D****	**.095**	**A**	**.905**	**3.094**	**2.173**

7470	**S**	**D****	**.039**	**A**	**.961**	**4.947**	**2.546**
7494	**S**	**D****	**.044**	**A**	**.956**	**4.679**	**2.503**
7524	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
7692	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
7694	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
7713	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
7753	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
7754	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
7822	**S**	**D****	**.066**	**A**	**.934**	**3.754**	**2.333**
7823	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
7861	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
7871	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
7944	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
8000	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
8003	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
8015	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
8018	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
8020	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
8023	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
8028	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
8059	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
8084	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**

8098	**S**	**D****	**.032**	**A**	**.968**	**5.456**	**2.620**
8125	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
8128	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
8153	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
8337	**S**	**D****	**.039**	**A**	**.961**	**4.962**	**2.548**
8341	**S**	**D****	**.034**	**A**	**.966**	**5.310**	**2.599**
8359	**S**	**D****	**.042**	**A**	**.958**	**4.747**	**2.515**
8404	**S**	**D****	**.025**	**A**	**.975**	**6.209**	**2.713**
8465	**S**	**D****	**.039**	**A**	**.961**	**4.962**	**2.548**
8530	**S**	**D****	**.039**	**A**	**.961**	**4.962**	**2.548**
8538	**S**	**D****	**.042**	**A**	**.958**	**4.747**	**2.515**
8557	**S**	**D****	**.042**	**A**	**.958**	**4.747**	**2.515**
8610	**S**	**D****	**.047**	**A**	**.953**	**4.509**	**2.475**
8619	**S**	**D****	**.047**	**A**	**.953**	**4.509**	**2.475**
8641	**S**	**D****	**.028**	**A**	**.972**	**5.897**	**2.676**
8657	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
8679	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
8688	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
8762	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
8766	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
8770	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
8776	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**

8781	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
8798	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
8847	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
8866	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
8912	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
8948	**S**	**D****	**.105**	**A**	**.895**	**2.920**	**2.126**
8968	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
8971	**S**	**D****	**.071**	**A**	**.929**	**3.610**	**2.301**
9002	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9006	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9047	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9054	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
9061	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9068	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9089	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9090	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9103	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9105	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9124	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9138	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9227	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
9234	**S**	**D****	**.105**	**A**	**.895**	**2.920**	**2.126**

9276	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9286	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9296	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9318	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9360	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
9361	**S**	**D****	**.082**	**A**	**.918**	**3.350**	**2.241**
9363	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
9400	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9408	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9420	**S**	**D****	**.078**	**A**	**.922**	**3.429**	**2.259**
9429	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9438	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9459	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9470	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9479	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9519	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9532	**S**	**D****	**.038**	**A**	**.962**	**5.021**	**2.558**
9534	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9540	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9543	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9547	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9557	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**

9563	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9568	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9593	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9611	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9638	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9646	**S**	**D****	**.064**	**A**	**.936**	**3.826**	**2.351**
9650	**S**	**D****	**.061**	**A**	**.939**	**3.913**	**2.366**
9654	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
9663	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
9664	**S**	**D****	**.051**	**A**	**.949**	**4.306**	**2.441**
9673	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
9674	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
9677	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9694	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9711	**S**	**D****	**.115**	**A**	**.885**	**2.773**	**2.082**
9716	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9739	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9751	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9763	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9766	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9780	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9783	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**

9784	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9799	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9801	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9822	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9823	**S**	**D****	**.077**	**A**	**.923**	**3.470**	**2.268**
9842	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9866	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9878	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9889	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9896	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
9898	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9908	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9913	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9922	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
9928	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9933	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9971	**S**	**D****	**.115**	**A**	**.885**	**2.773**	**2.082**
9974	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
9983	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
10015	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
10021	**S**	**D****	**.093**	**A**	**.907**	**3.114**	**2.178**
10030	**S**	**D****	**.121**	**A**	**.879**	**2.693**	**2.056**

10095	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
10111	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
10122	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
10129	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
10141	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
10152	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
10154	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
10199	**S**	**D****	**.034**	**A**	**.966**	**5.325**	**2.602**
10227	**S**	**D****	**.040**	**A**	**.960**	**4.914**	**2.542**
10229	**S**	**D****	**.062**	**A**	**.938**	**3.897**	**2.360**
10231	**S**	**D****	**.093**	**A**	**.907**	**3.114**	**2.178**
10244	**S**	**D****	**.062**	**A**	**.938**	**3.897**	**2.360**
10302	**S**	**D****	**.062**	**A**	**.938**	**3.897**	**2.360**
10330	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
10347	**S**	**D****	**.093**	**A**	**.907**	**3.114**	**2.178**
10366	**S**	**D****	**.121**	**A**	**.879**	**2.693**	**2.056**
10381	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
10385	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
10391	**S**	**D****	**.063**	**A**	**.937**	**3.868**	**2.355**
10407	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
10430	**S**	**D****	**.123**	**A**	**.877**	**2.673**	**2.049**
10441	**S**	**D****	**.123**	**A**	**.877**	**2.673**	**2.049**

10457	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
10466	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
10481	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
10496	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
10519	**S**	**D****	**.038**	**A**	**.962**	**5.058**	**2.564**
10523	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
10530	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
10545	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
10563	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
10578	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
10605	**S**	**D****	**.050**	**A**	**.950**	**4.368**	**2.452**
10613	**S**	**D****	**.049**	**A**	**.951**	**4.422**	**2.460**
10617	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
10638	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
10658	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
10677	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
10683	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
10686	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
10755	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
10757	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
10806	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
10810	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**

10859	**S**	**D****	**.061**	**A**	**.939**	**3.924**	**2.366**
10872	**S**	**D****	**.092**	**A**	**.908**	**3.136**	**2.184**
10887	**S**	**D****	**.066**	**A**	**.934**	**3.755**	**2.331**
10914	**S**	**D****	**.092**	**A**	**.908**	**3.136**	**2.184**
10917	**S**	**D****	**.129**	**A**	**.871**	**2.595**	**2.024**
10920	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
10926	**S**	**D****	**.061**	**A**	**.939**	**3.924**	**2.366**
10937	**S**	**D****	**.066**	**A**	**.934**	**3.755**	**2.331**
10942	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
10945	**S**	**D****	**.129**	**A**	**.871**	**2.595**	**2.024**
10965	**S**	**D****	**.066**	**A**	**.934**	**3.755**	**2.331**
10971	**S**	**D****	**.092**	**A**	**.908**	**3.136**	**2.184**
10985	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
11041	**S**	**D****	**.187**	**A**	**.813**	**2.087**	**2.029**
11101	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
11149	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
11163	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
11170	**S**	**D****	**.045**	**A**	**.955**	**4.599**	**2.493**
11171	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
11226	**S**	**D****	**.131**	**A**	**.869**	**2.578**	**2.018**
11266	**S**	**D****	**.131**	**A**	**.869**	**2.578**	**2.018**
11284	**S**	**D****	**.037**	**A**	**.963**	**5.097**	**2.569**

11292	**S**	**D****	**.045**	**A**	**.955**	**4.599**	**2.493**
11309	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
11326	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
11396	**S**	**D****	**.027**	**A**	**.973**	**6.037**	**2.693**
11402	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
11403	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
11414	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
11423	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
11425	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
11442	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
11451	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
11454	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
11476	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
11484	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
11493	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
11499	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
11502	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
11522	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
11529	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
11544	**S**	**D****	**.054**	**A**	**.946**	**4.172**	**2.415**
11578	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
11611	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**

11621	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**
11627	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
11644	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
11645	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
11680	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
11687	**S**	**D****	**.093**	**A**	**.907**	**3.128**	**2.184**
11688	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**
11696	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
11710	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
11715	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
11722	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**
11727	**S**	**D****	**.093**	**A**	**.907**	**3.128**	**2.184**
11744	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
11768	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
11779	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
11800	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
11809	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
11815	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
11818	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
11820	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
11825	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
11834	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**

11843	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
11848	**S**	**D****	**.074**	**A**	**.926**	**3.543**	**2.284**
11892	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
11900	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
11935	**S**	**D****	**.048**	**A**	**.952**	**4.467**	**2.467**
11954	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
11968	**S**	**D****	**.052**	**A**	**.948**	**4.274**	**2.433**
11970	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
11976	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
11999	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
12000	**S**	**D****	**.048**	**A**	**.952**	**4.467**	**2.467**
12006	**S**	**D****	**.079**	**A**	**.921**	**3.415**	**2.254**
12075	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
12077	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
12131	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**
12173	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
12177	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
12187	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
12199	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
12207	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
12216	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
12277	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**

12311	**S**	**D****	**.113**	**A**	**.887**	**2.805**	**2.091**
12317	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
12324	**S**	**D****	**.047**	**A**	**.953**	**4.486**	**2.472**
12328	**S**	**D****	**.120**	**A**	**.880**	**2.703**	**2.059**
12355	**S**	**D****	**.034**	**A**	**.966**	**5.344**	**2.605**
12356	**S**	**D****	**.024**	**A**	**.976**	**6.329**	**2.727**
12362	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
12415	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
12426	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
12433	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
12441	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
12480	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
12499	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
12514	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
12529	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
12568	**S**	**D****	**.050**	**A**	**.950**	**4.374**	**2.452**
12623	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
12646	**S**	**D****	**.034**	**A**	**.966**	**5.344**	**2.605**
12668	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
12672	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
12681	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
12689	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**

12729	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
12731	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
12750	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
12753	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
12789	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
12796	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
12805	**S**	**D****	**.034**	**A**	**.966**	**5.344**	**2.605**
12820	**S**	**D****	**.111**	**A**	**.889**	**2.825**	**2.096**
12877	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
12883	**S**	**D****	**.081**	**A**	**.919**	**3.363**	**2.241**
12908	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
12910	**S**	**D****	**.075**	**A**	**.925**	**3.514**	**2.277**
12915	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
12930	**S**	**D****	**.048**	**A**	**.952**	**4.432**	**2.463**
12934	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
12960	**S**	**D****	**.051**	**A**	**.949**	**4.315**	**2.443**
12966	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
13003	**S**	**D****	**.075**	**A**	**.925**	**3.514**	**2.277**
13012	**S**	**D****	**.066**	**A**	**.934**	**3.761**	**2.333**
13023	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
13032	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
13050	**S**	**D****	**.068**	**A**	**.932**	**3.716**	**2.324**

13069	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
13075	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
13076	**S**	**D****	**.089**	**A**	**.911**	**3.194**	**2.199**
13083	**S**	**D****	**.056**	**A**	**.944**	**4.098**	**2.402**
13129	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
13172	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
13178	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
13206	**S**	**D****	**.050**	**A**	**.950**	**4.364**	**2.452**
13220	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
13231	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
13236	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
13245	**S**	**D****	**.089**	**A**	**.911**	**3.194**	**2.199**
13259	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
13285	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
13289	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
13321	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
13323	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
13369	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
13393	**S**	**D****	**.048**	**A**	**.952**	**4.477**	**2.469**
13395	**S**	**D****	**.087**	**A**	**.913**	**3.233**	**2.209**
13417	**S**	**D****	**.044**	**A**	**.956**	**4.679**	**2.503**
13425	**S**	**D****	**.048**	**A**	**.952**	**4.477**	**2.469**

13434	**S**	**D****	**.019**	**A**	**.981**	**7.245**	**2.822**
13453	**S**	**D****	**.087**	**A**	**.913**	**3.233**	**2.209**
13454	**S**	**D****	**.079**	**A**	**.921**	**3.419**	**2.257**
13461	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
13466	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
13482	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
13484	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
13567	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
13582	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
13621	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
13653	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
13664	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
13669	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
13673	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
13682	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
13683	**S**	**D****	**.034**	**A**	**.966**	**5.362**	**2.607**
13693	**S**	**D****	**.050**	**A**	**.950**	**4.360**	**2.451**
13702	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
13710	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
13720	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
13728	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
13729	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**

13738	**S**	**D****	**.031**	**A**	**.969**	**5.604**	**2.639**
13769	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
13806	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
13811	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
13816	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
13833	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
13836	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
13905	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
13912	**S**	**D****	**.066**	**A**	**.934**	**3.754**	**2.333**
13916	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
13955	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
14002	**S**	**D****	**.023**	**A**	**.977**	**6.565**	**2.753**
14010	**S**	**D****	**.022**	**A**	**.978**	**6.645**	**2.762**
14021	**S**	**D****	**.018**	**A**	**.982**	**7.325**	**2.831**
14073	**S**	**D****	**.025**	**A**	**.975**	**6.209**	**2.713**
14076	**S**	**D****	**.039**	**A**	**.961**	**4.962**	**2.548**
14083	**S**	**D****	**.025**	**A**	**.975**	**6.209**	**2.713**
14094	**S**	**D****	**.042**	**A**	**.958**	**4.747**	**2.515**
14116	**S**	**D****	**.022**	**A**	**.978**	**6.645**	**2.762**
14119	**S**	**D****	**.025**	**A**	**.975**	**6.209**	**2.713**
14131	**S**	**D****	**.039**	**A**	**.961**	**4.962**	**2.548**
14139	**S**	**D****	**.042**	**A**	**.958**	**4.747**	**2.515**

14175	**S**	**D****	**.028**	**A**	**.972**	**5.941**	**2.681**
14208	**S**	**D****	**.047**	**A**	**.953**	**4.509**	**2.475**
14234	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
14245	**S**	**D****	**.035**	**A**	**.965**	**5.287**	**2.596**
14273	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
14281	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
14288	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
14299	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
14306	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
14379	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14396	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
14420	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
14443	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14450	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14493	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14495	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14497	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14512	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14530	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14547	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
14573	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
14574	**S**	**D****	**.035**	**A**	**.965**	**5.287**	**2.596**

14576	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
14612	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14626	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
14635	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14670	**S**	**D****	**.082**	**A**	**.918**	**3.350**	**2.241**
14671	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
14681	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
14709	**S**	**D****	**.038**	**A**	**.962**	**5.021**	**2.558**
14716	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14719	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14721	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14725	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14728	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14736	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14737	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14738	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14746	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14755	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14790	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14800	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14807	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14809	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**

14813	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14817	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14831	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14833	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14845	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14847	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14848	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14855	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14862	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14874	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14876	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14878	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14900	**S**	**D****	**.051**	**A**	**.949**	**4.306**	**2.441**
14903	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
14910	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14919	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14928	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14944	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
14972	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
14978	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
15023	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
15028	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**

15042	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
15044	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
15049	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
15050	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
15056	**S**	**D****	**.077**	**A**	**.923**	**3.470**	**2.268**
15060	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
15077	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
15078	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
15086	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
15088	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
15089	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
15091	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
15097	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
15115	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
15136	**S**	**D****	**.077**	**A**	**.923**	**3.470**	**2.268**
15178	**S**	**D****	**.076**	**A**	**.924**	**3.483**	**2.272**
15187	**S**	**D****	**.121**	**A**	**.879**	**2.693**	**2.056**
15206	**S**	**D****	**.062**	**A**	**.938**	**3.897**	**2.360**
15222	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
15244	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
15246	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
15253	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**

15254	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
15257	**S**	**D****	**.038**	**A**	**.962**	**5.000**	**2.555**
15285	**S**	**D****	**.050**	**A**	**.950**	**4.358**	**2.449**
15300	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
15306	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
15321	**S**	**D****	**.051**	**A**	**.949**	**4.306**	**2.440**
15331	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
15393	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
15419	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
15444	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
15455	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
15461	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
15477	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
15487	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
15489	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
15517	**S**	**D****	**.118**	**A**	**.882**	**2.732**	**2.068**
15523	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
15532	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
15556	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
15561	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
15571	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
15588	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**

15601	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
15660	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
15661	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
15672	**S**	**D****	**.066**	**A**	**.934**	**3.755**	**2.331**
15688	**S**	**D****	**.092**	**A**	**.908**	**3.136**	**2.184**
15698	**S**	**D****	**.129**	**A**	**.871**	**2.595**	**2.024**
15713	**S**	**D****	**.061**	**A**	**.939**	**3.924**	**2.366**
15717	**S**	**D****	**.120**	**A**	**.880**	**2.712**	**2.062**
15733	**S**	**D****	**.026**	**A**	**.974**	**6.076**	**2.698**
15748	**S**	**D****	**.066**	**A**	**.934**	**3.755**	**2.331**
15755	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
15767	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
15831	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
15838	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
15840	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
15850	**S**	**D****	**.084**	**A**	**.916**	**3.294**	**2.227**
15856	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
15862	**S**	**D****	**.054**	**A**	**.946**	**4.172**	**2.415**
15864	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
15885	**S**	**D****	**.027**	**A**	**.973**	**6.037**	**2.693**
15895	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
15916	**S**	**D****	**.045**	**A**	**.955**	**4.599**	**2.493**

15987	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
15990	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
15998	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
16008	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
16011	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
16018	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
16026	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
16031	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
16035	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
16039	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
16040	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
16046	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
16048	**S**	**D****	**.027**	**A**	**.973**	**6.037**	**2.693**
16059	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
16074	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
16095	**S**	**D****	**.050**	**A**	**.950**	**4.368**	**2.454**
16100	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16103	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
16104	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
16112	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**
16113	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16116	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**

16131	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
16143	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16145	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**
16147	**S**	**D****	**.060**	**A**	**.940**	**3.962**	**2.375**
16156	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16173	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
16180	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
16181	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
16183	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16187	**S**	**D****	**.074**	**A**	**.926**	**3.543**	**2.284**
16190	**S**	**D****	**.093**	**A**	**.907**	**3.128**	**2.184**
16191	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16195	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16201	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
16206	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
16224	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
16246	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
16248	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16270	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
16276	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16277	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
16288	**S**	**D****	**.074**	**A**	**.926**	**3.543**	**2.284**

16289	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
16291	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
16312	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
16315	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
16326	**S**	**D****	**.035**	**A**	**.965**	**5.270**	**2.596**
16337	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
16347	**S**	**D****	**.048**	**A**	**.952**	**4.467**	**2.467**
16358	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
16363	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
16364	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
16379	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
16422	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
16437	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
16440	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
16447	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
16457	**S**	**D****	**.071**	**A**	**.929**	**3.628**	**2.305**
16470	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
16480	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
16487	**S**	**D****	**.113**	**A**	**.887**	**2.805**	**2.091**
16498	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**
16499	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
16503	**S**	**D****	**.053**	**A**	**.947**	**4.243**	**2.427**

16526	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
16547	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
16555	**S**	**D****	**.113**	**A**	**.887**	**2.805**	**2.091**
16559	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
16563	**S**	**D****	**.113**	**A**	**.887**	**2.805**	**2.091**
16599	**S**	**D****	**.050**	**A**	**.950**	**4.374**	**2.452**
16603	**S**	**D****	**.050**	**A**	**.950**	**4.374**	**2.452**
16620	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
16621	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
16633	**S**	**D****	**.034**	**A**	**.966**	**5.344**	**2.605**
16639	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
16661	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
16662	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
16666	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
16697	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
16732	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
16735	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
16736	**S**	**D****	**.111**	**A**	**.889**	**2.825**	**2.096**
16762	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
16773	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
16792	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
16797	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**

16809	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
16823	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
16864	**S**	**D****	**.111**	**A**	**.889**	**2.825**	**2.096**
16899	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
16909	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
16915	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
16935	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
16982	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
16987	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
16991	**S**	**D****	**.075**	**A**	**.925**	**3.514**	**2.277**
16995	**S**	**D****	**.100**	**A**	**.900**	**3.005**	**2.150**
17014	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
17015	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
17028	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
17029	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
17041	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
17063	**S**	**D****	**.074**	**A**	**.926**	**3.529**	**2.283**
17101	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
17118	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
17129	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
17147	**S**	**D****	**.089**	**A**	**.911**	**3.194**	**2.199**
17148	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**

17161	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
17187	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
17193	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
17200	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
17227	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
17230	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
17246	**S**	**D****	**.048**	**A**	**.952**	**4.477**	**2.469**
17293	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
17295	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
17320	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
17334	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
17340	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
17360	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
17374	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
17413	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17432	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17444	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
17453	**S**	**D****	**.034**	**A**	**.966**	**5.362**	**2.607**
17459	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17464	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17467	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17468	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**

17474	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17484	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17485	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
17486	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17500	**S**	**D****	**.029**	**A**	**.971**	**5.810**	**2.666**
17501	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
17510	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
17511	**S**	**D****	**.104**	**A**	**.896**	**2.938**	**2.130**
17521	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
17524	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17548	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
17586	**S**	**D****	**.021**	**A**	**.979**	**6.881**	**2.786**
17588	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
17593	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
17618	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
17621	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
17623	**S**	**D****	**.066**	**A**	**.934**	**3.754**	**2.333**
17635	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
17655	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
17661	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
17662	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
17674	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**

17682	**S**	**D****	**.034**	**A**	**.966**	**5.310**	**2.599**
17696	**S**	**D****	**.016**	**A**	**.984**	**7.831**	**2.876**
17706	**S**	**D****	**.034**	**A**	**.966**	**5.310**	**2.599**
17756	**S**	**D****	**.042**	**A**	**.958**	**4.747**	**2.515**
17803	**S**	**D****	**.047**	**A**	**.953**	**4.509**	**2.475**
17818	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
17824	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
17840	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
17842	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
17848	**S**	**D****	**.070**	**A**	**.930**	**3.654**	**2.310**
17849	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
17858	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
17869	**S**	**D****	**.107**	**A**	**.893**	**2.885**	**2.116**
17873	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
17874	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
17898	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
17910	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
17926	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
17934	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
17942	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
17951	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
17957	**S**	**D****	**.077**	**A**	**.923**	**3.470**	**2.268**

17965	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
17973	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
17998	**S**	**D****	**.071**	**A**	**.929**	**3.610**	**2.301**
18007	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
18016	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
18026	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18043	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18047	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18063	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18066	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18079	**S**	**D****	**.035**	**A**	**.965**	**5.287**	**2.596**
18081	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
18092	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18097	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18102	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18110	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18114	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18123	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18130	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18137	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18140	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18154	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**

18167	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18176	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18179	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18187	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18189	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18193	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18196	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18210	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18216	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18233	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18236	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18237	**S**	**D****	**.118**	**A**	**.882**	**2.740**	**2.073**
18253	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
18254	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
18264	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18274	**S**	**D****	**.115**	**A**	**.885**	**2.773**	**2.082**
18285	**S**	**D****	**.078**	**A**	**.922**	**3.429**	**2.259**
18286	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18292	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18304	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18306	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18319	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**

18329	**S**	**D****	**.078**	**A**	**.922**	**3.429**	**2.259**
18342	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18360	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18367	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18369	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18370	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
18376	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18379	**S**	**D****	**.053**	**A**	**.947**	**4.240**	**2.429**
18382	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18385	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18386	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
18397	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18398	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18401	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18410	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18418	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18419	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18420	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18421	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18425	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18429	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
18430	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**

18443	**S**	**D****	**.062**	**A**	**.938**	**3.897**	**2.360**
18449	**S**	**D****	**.078**	**A**	**.922**	**3.441**	**2.263**
18458	**S**	**D****	**.121**	**A**	**.879**	**2.693**	**2.056**
18465	**S**	**D****	**.062**	**A**	**.938**	**3.897**	**2.360**
18488	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
18490	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
18492	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
18493	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
18494	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
18496	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
18497	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
18524	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
18551	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
18565	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
18570	**S**	**D****	**.063**	**A**	**.937**	**3.868**	**2.355**
18580	**S**	**D****	**.123**	**A**	**.877**	**2.673**	**2.049**
18582	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
18588	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
18591	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
18599	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
18602	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
18605	**S**	**D****	**.109**	**A**	**.891**	**2.861**	**2.109**

18613	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
18618	**S**	**D****	**.109**	**A**	**.891**	**2.855**	**2.106**
18619	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
18621	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
18622	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
18625	**S**	**D****	**.039**	**A**	**.961**	**4.986**	**2.553**
18628	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
18642	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
18646	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
18652	**S**	**D****	**.074**	**A**	**.926**	**3.533**	**2.283**
18659	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
18666	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
18676	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
18682	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
18688	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
18705	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
18706	**S**	**D****	**.060**	**A**	**.940**	**3.953**	**2.372**
18719	**S**	**D****	**.092**	**A**	**.908**	**3.136**	**2.184**
18722	**S**	**D****	**.066**	**A**	**.934**	**3.755**	**2.331**
18742	**S**	**D****	**.129**	**A**	**.871**	**2.595**	**2.024**
18750	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
18753	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**

18754	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
18764	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
18766	**S**	**D****	**.066**	**A**	**.934**	**3.755**	**2.331**
18778	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
18779	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
18790	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
18803	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
18820	**S**	**D****	**.027**	**A**	**.973**	**6.037**	**2.693**
18822	**S**	**D****	**.131**	**A**	**.869**	**2.578**	**2.018**
18831	**S**	**D****	**.037**	**A**	**.963**	**5.097**	**2.569**
18835	**S**	**D****	**.131**	**A**	**.869**	**2.578**	**2.018**
18849	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
18859	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
18860	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
18890	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
18900	**S**	**D****	**.042**	**A**	**.958**	**4.787**	**2.522**
18907	**S**	**D****	**.083**	**A**	**.917**	**3.334**	**2.236**
18909	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
18910	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
18915	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
18917	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
18928	**S**	**D****	**.027**	**A**	**.973**	**6.037**	**2.693**

18937	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
18939	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
18966	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
18967	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
18973	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
18977	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
18982	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
19019	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
19025	**S**	**D****	**.093**	**A**	**.907**	**3.128**	**2.184**
19026	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
19034	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
19054	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
19080	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
19085	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
19092	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
19093	**S**	**D****	**.074**	**A**	**.926**	**3.543**	**2.284**
19097	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
19101	**S**	**D****	**.074**	**A**	**.926**	**3.543**	**2.284**
19108	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
19111	**S**	**D****	**.103**	**A**	**.897**	**2.954**	**2.134**
19116	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
19120	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**

19124	**S**	**D****	**.079**	**A**	**.921**	**3.415**	**2.254**
19135	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
19141	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
19147	**S**	**D****	**.079**	**A**	**.921**	**3.415**	**2.254**
19159	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
19185	**S**	**D****	**.071**	**A**	**.929**	**3.628**	**2.305**
19200	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
19219	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
19231	**S**	**D****	**.046**	**A**	**.954**	**4.540**	**2.481**
19241	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
19269	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
19293	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
19303	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
19304	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
19310	**S**	**D****	**.120**	**A**	**.880**	**2.703**	**2.059**
19318	**S**	**D****	**.024**	**A**	**.976**	**6.329**	**2.727**
19326	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
19333	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
19337	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
19338	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
19345	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
19353	**S**	**D****	**.034**	**A**	**.966**	**5.344**	**2.605**

19359	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
19369	**S**	**D****	**.061**	**A**	**.939**	**3.911**	**2.363**
19387	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
19389	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
19393	**S**	**D****	**.076**	**A**	**.924**	**3.495**	**2.275**
19394	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**
19397	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
19419	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
19439	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
19440	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
19448	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
19455	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
19463	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
19464	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
19466	**S**	**D****	**.081**	**A**	**.919**	**3.363**	**2.241**
19468	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
19487	**S**	**D****	**.075**	**A**	**.925**	**3.514**	**2.277**
19501	**S**	**D****	**.081**	**A**	**.919**	**3.363**	**2.241**
19504	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
19511	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
19522	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
19527	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**

19544	**S**	**D****	**.089**	**A**	**.911**	**3.194**	**2.199**
19560	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
19567	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
19571	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
19587	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
19597	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
19602	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
19604	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
19606	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
19616	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
19650	**S**	**D****	**.056**	**A**	**.944**	**4.098**	**2.402**
19653	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
19683	**S**	**D****	**.067**	**A**	**.933**	**3.739**	**2.327**
19695	**S**	**D****	**.087**	**A**	**.913**	**3.233**	**2.209**
19704	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
19728	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
19762	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
19765	**S**	**D****	**.104**	**A**	**.896**	**2.938**	**2.130**
19775	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
19777	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
19781	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
19799	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**

19805	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
19833	**S**	**D****	**.052**	**A**	**.948**	**4.252**	**2.429**
19846	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
19862	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
19880	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
19939	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
19946	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
19955	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
19964	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
19968	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
19983	**S**	**D****	**.025**	**A**	**.975**	**6.209**	**2.713**
19995	**S**	**D****	**.039**	**A**	**.961**	**4.962**	**2.548**
20001	**S**	**D****	**.042**	**A**	**.958**	**4.747**	**2.515**
20012	**S**	**D****	**.042**	**A**	**.958**	**4.747**	**2.515**
20017	**S**	**D****	**.025**	**A**	**.975**	**6.209**	**2.713**
20036	**S**	**D****	**.118**	**A**	**.882**	**2.728**	**2.066**
20043	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
20044	**S**	**D****	**.070**	**A**	**.930**	**3.654**	**2.310**
20073	**S**	**D****	**.054**	**A**	**.946**	**4.192**	**2.420**
20074	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
20082	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20084	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**

20090	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20111	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20119	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20120	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20122	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20132	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
20154	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
20169	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20172	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20175	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20182	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
20191	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20202	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20205	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20207	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20220	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20224	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20228	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20249	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20254	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20264	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20268	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**

20274	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20279	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20298	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20301	**S**	**D****	**.064**	**A**	**.936**	**3.826**	**2.351**
20332	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20338	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20347	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20356	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20371	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20388	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20395	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
20396	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20397	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20407	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20409	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
20423	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
20425	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20431	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20437	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20442	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
20449	**S**	**D****	**.062**	**A**	**.938**	**3.897**	**2.360**
20451	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**

20452	**S**	**D****	**.050**	**A**	**.950**	**4.358**	**2.449**
20453	**S**	**D****	**.078**	**A**	**.922**	**3.441**	**2.263**
20454	**S**	**D****	**.078**	**A**	**.922**	**3.441**	**2.263**
20457	**S**	**D****	**.121**	**A**	**.879**	**2.693**	**2.056**
20458	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
20459	**S**	**D****	**.093**	**A**	**.907**	**3.114**	**2.178**
20460	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
20465	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
20482	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
20484	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
20491	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
20505	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
20525	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
20533	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
20534	**S**	**D****	**.133**	**A**	**.867**	**2.558**	**2.012**
20550	**S**	**D****	**.055**	**A**	**.945**	**4.132**	**2.407**
20553	**S**	**D****	**.118**	**A**	**.882**	**2.732**	**2.068**
20560	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
20562	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
20573	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
20580	**S**	**D****	**.084**	**A**	**.916**	**3.302**	**2.227**
20596	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**

20601	**S**	**D****	**.129**	**A**	**.871**	**2.595**	**2.024**
20608	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
20609	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
20610	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
20614	**S**	**D****	**.120**	**A**	**.880**	**2.712**	**2.062**
20615	**S**	**D****	**.066**	**A**	**.934**	**3.755**	**2.331**
20620	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
20625	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
20629	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
20632	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
20637	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
20639	**S**	**D****	**.042**	**A**	**.958**	**4.787**	**2.522**
20652	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
20653	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
20659	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
20666	**S**	**D****	**.027**	**A**	**.973**	**6.037**	**2.693**
20669	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
20681	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
20689	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
20698	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
20712	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
20718	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**

20721	**S**	**D****	**.068**	**A**	**.932**	**3.703**	**2.319**
20724	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
20726	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
20734	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
20738	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
20740	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
20757	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
20759	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
20769	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
20770	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
20801	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
20809	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
20819	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
20831	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
20833	**S**	**D****	**.095**	**A**	**.905**	**3.087**	**2.171**
20839	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
20865	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
20870	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
20878	**S**	**D****	**.080**	**A**	**.920**	**3.390**	**2.248**
20888	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
20902	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
20917	**S**	**D****	**.056**	**A**	**.944**	**4.087**	**2.398**

20927	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
20933	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
20937	**S**	**D****	**.120**	**A**	**.880**	**2.703**	**2.059**
20943	**S**	**D****	**.111**	**A**	**.889**	**2.825**	**2.096**
20947	**S**	**D****	**.022**	**A**	**.978**	**6.740**	**2.773**
20954	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
20956	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
20958	**S**	**D****	**.034**	**A**	**.966**	**5.344**	**2.605**
20961	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
20967	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
20969	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
20972	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
20983	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
21002	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
21009	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
21011	**S**	**D****	**.081**	**A**	**.919**	**3.363**	**2.241**
21026	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
21038	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
21043	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21073	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21080	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
21085	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**

21087	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21089	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21101	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21102	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
21104	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
21112	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
21115	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21128	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21134	**S**	**D****	**.056**	**A**	**.944**	**4.098**	**2.402**
21135	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
21139	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
21152	**S**	**D****	**.044**	**A**	**.956**	**4.679**	**2.503**
21158	**S**	**D****	**.079**	**A**	**.921**	**3.419**	**2.257**
21169	**S**	**D****	**.054**	**A**	**.946**	**4.189**	**2.422**
21187	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
21191	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
21196	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
21208	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
21227	**S**	**D****	**.043**	**A**	**.957**	**4.698**	**2.507**
21234	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
21243	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
21245	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**

21248	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
21251	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
21277	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
21278	**S**	**D****	**.043**	**A**	**.957**	**4.698**	**2.507**
21290	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
21301	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
21306	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
21316	**S**	**D****	**.066**	**A**	**.934**	**3.754**	**2.333**
21317	**S**	**D****	**.035**	**A**	**.965**	**5.243**	**2.592**
21326	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
21337	**S**	**D****	**.025**	**A**	**.975**	**6.209**	**2.713**
21347	**S**	**D****	**.042**	**A**	**.958**	**4.747**	**2.515**
21357	**S**	**D****	**.030**	**A**	**.970**	**5.642**	**2.644**
21366	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
21370	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
21378	**S**	**D****	**.079**	**A**	**.921**	**3.414**	**2.253**
21382	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21387	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21389	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21390	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21403	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21404	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**

21437	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21446	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21447	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21460	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21473	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21476	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21490	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21494	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21499	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21504	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
21511	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21513	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21516	**S**	**D****	**.094**	**A**	**.906**	**3.103**	**2.175**
21530	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21538	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21541	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21552	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21553	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21561	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21562	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21563	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21565	**S**	**D****	**.115**	**A**	**.885**	**2.773**	**2.082**

21571	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21572	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21573	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21574	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21589	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21607	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
21608	**S**	**D****	**.115**	**A**	**.885**	**2.773**	**2.082**
21609	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
21611	**S**	**D****	**.050**	**A**	**.950**	**4.358**	**2.449**
21612	**S**	**D****	**.078**	**A**	**.922**	**3.441**	**2.263**
21614	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
21616	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
21620	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
21622	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
21626	**S**	**D****	**.112**	**A**	**.888**	**2.814**	**2.093**
21628	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
21630	**S**	**D****	**.057**	**A**	**.943**	**4.073**	**2.395**
21631	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
21632	**S**	**D****	**.064**	**A**	**.936**	**3.839**	**2.354**
21634	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
21636	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
21637	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**

21641	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
21648	**S**	**D****	**.095**	**A**	**.905**	**3.091**	**2.172**
21649	**S**	**D****	**.103**	**A**	**.897**	**2.957**	**2.135**
21663	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
21668	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
21671	**S**	**D****	**.091**	**A**	**.909**	**3.159**	**2.190**
21677	**S**	**D****	**.118**	**A**	**.882**	**2.732**	**2.068**
21680	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
21685	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
21687	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
21689	**S**	**D****	**.100**	**A**	**.900**	**3.000**	**2.147**
21695	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
21701	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
21704	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
21705	**S**	**D****	**.042**	**A**	**.958**	**4.787**	**2.522**
21728	**S**	**D****	**.093**	**A**	**.907**	**3.115**	**2.178**
21733	**S**	**D****	**.121**	**A**	**.879**	**2.694**	**2.056**
21734	**S**	**D****	**.067**	**A**	**.933**	**3.730**	**2.325**
21737	**S**	**D****	**.062**	**A**	**.938**	**3.898**	**2.360**
21741	**S**	**D****	**.101**	**A**	**.899**	**2.981**	**2.141**
21750	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
21753	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**

21755	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
21759	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
21760	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
21769	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
21775	**S**	**D****	**.074**	**A**	**.926**	**3.543**	**2.284**
21780	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
21787	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
21820	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
21830	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
21835	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
21839	**S**	**D****	**.087**	**A**	**.913**	**3.244**	**2.212**
21852	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
21866	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
21869	**S**	**D****	**.111**	**A**	**.889**	**2.825**	**2.096**
21874	**S**	**D****	**.120**	**A**	**.880**	**2.703**	**2.059**
21890	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
21891	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
21895	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
21896	**S**	**D****	**.093**	**A**	**.907**	**3.125**	**2.181**
21900	**S**	**D****	**.086**	**A**	**.914**	**3.266**	**2.218**
21908	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**
21909	**S**	**D****	**.122**	**A**	**.878**	**2.687**	**2.053**

21912	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
21921	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
21928	**S**	**D****	**.066**	**A**	**.934**	**3.761**	**2.333**
21933	**S**	**D****	**.100**	**A**	**.900**	**3.005**	**2.150**
21941	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21964	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
21970	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21972	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
21973	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
21994	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
21996	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
22002	**S**	**D****	**.067**	**A**	**.933**	**3.739**	**2.327**
22026	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
22046	**S**	**D****	**.044**	**A**	**.956**	**4.643**	**2.499**
22052	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
22058	**S**	**D****	**.048**	**A**	**.952**	**4.444**	**2.463**
22059	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
22061	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
22062	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
22071	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
22083	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
22085	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**

22086	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
22089	**S**	**D****	**.080**	**A**	**.920**	**3.398**	**2.250**
22105	**S**	**D****	**.042**	**A**	**.958**	**4.756**	**2.516**
22112	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
22113	**S**	**D****	**.025**	**A**	**.975**	**6.209**	**2.713**
22117	**S**	**D****	**.086**	**A**	**.914**	**3.267**	**2.217**
22120	**S**	**D****	**.128**	**A**	**.872**	**2.610**	**2.029**
22127	**S**	**D****	**.087**	**A**	**.913**	**3.243**	**2.211**
22130	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22131	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22135	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22138	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22157	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22169	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22174	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22186	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22188	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22193	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22196	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
22198	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
22210	**S**	**D****	**.103**	**A**	**.897**	**2.959**	**2.135**
22215	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**

22217	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
22221	**S**	**D****	**.074**	**A**	**.926**	**3.543**	**2.284**
22230	**S**	**D****	**.111**	**A**	**.889**	**2.831**	**2.098**
22232	**S**	**D****	**.073**	**A**	**.927**	**3.570**	**2.290**
22236	**S**	**D****	**.104**	**A**	**.896**	**2.932**	**2.128**
22245	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
22246	**S**	**D****	**.113**	**A**	**.887**	**2.808**	**2.091**
22259	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
22262	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
22271	**S**	**D****	**.082**	**A**	**.918**	**3.338**	**2.235**
22279	**S**	**D****	**.123**	**A**	**.877**	**2.667**	**2.047**
22289	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
22290	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
22297	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
22299	**S**	**D****	**.073**	**A**	**.927**	**3.551**	**2.286**
22301	**S**	**D****	**.096**	**A**	**.904**	**3.071**	**2.166**
22325	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22328	**S**	**D****	**.130**	**A**	**.870**	**2.591**	**2.022**
22345	**S**	**D****	**.086**	**A**	**.914**	**3.254**	**2.214**
22351	**S**	**D****	**.132**	**A**	**.868**	**2.559**	**2.011**
22362	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**
22364	**S**	**D****	**.133**	**A**	**.867**	**2.552**	**2.009**

22372	S	D**	.133	A	.867	2.552	2.009
22374	S	D**	.087	A	.913	3.233	2.209
22377	S	D**	.096	A	.904	3.071	2.166
22394	S	D**	.074	A	.926	3.543	2.284
22396	S	D**	.111	A	.889	2.831	2.098
22403	S	D**	.133	A	.867	2.552	2.009
22415	S	D**	.079	A	.921	3.414	2.253

a. S = Selected, U = Unselected cases, and ** = Misclassified cases.

b. Cases with studentized residuals greater than 2.000 are listed.

Appendix 2: Categorical variable coding of socio-economic variables.**(objective 2)**

Categorical Variables Codings

		Fre-quency	Parameter coding							
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Region	Western Cape	1484	.000	.000	.000	.000	.000	.000	.000	.000
	Eastern Cape	5558	1.000	.000	.000	.000	.000	.000	.000	.000
	Northern Cape	1962	.000	1.000	.000	.000	.000	.000	.000	.000
	Free State	1657	.000	.000	1.000	.000	.000	.000	.000	.000
	KwaZulu-Natal	3428	.000	.000	.000	1.000	.000	.000	.000	.000

	North West	1672	.000	.000	.000	.000	1.000	.000	.000	.000
	Gauteng	1882	.000	.000	.000	.000	.000	1.000	.000	.000
	Mpuma-langa	2245	.000	.000	.000	.000	.000	.000	1.000	.000
	Limpopo Province	2431	.000	.000	.000	.000	.000	.000	.000	1.000
Mother's occupa-tion	Not work-ing	13477	.000	.000	.000	.000	.000	.000	.000	
	Prof., Tech., Manag.	1041	1.000	.000	.000	.000	.000	.000	.000	
	Clerical	694	.000	1.000	.000	.000	.000	.000	.000	
	Sales	310	.000	.000	1.000	.000	.000	.000	.000	
	Agric-self employed	6	.000	.000	.000	1.000	.000	.000	.000	
	Services	597	.000	.000	.000	.000	1.000	.000	.000	
	Skilled manual	922	.000	.000	.000	.000	.000	1.000	.000	
	Unskilled manual	5272	.000	.000	.000	.000	.000	.000	1.000	
Highest educa-	No educa-tion	3035	.000	.000	.000					

tional level	**Primary**	**8173**	**1.000**	**.000**	**.000**					
	Secondary	**9915**	**.000**	**1.000**	**.000**					
	Higher	**1196**	**.000**	**.000**	**1.000**					
Typeof placeof residence	**Urban**	**11070**	**.000**							
	Rural	**11249**	**1.000**							

Appendix 3**: Categorical codings of objective 3.**

Categorical Variables Codings														
		Fre-quency	Parameter coding											
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Birth order-der number	1	311	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	2	5622	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	3	3628	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	4	2256	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	5	1344	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	6	774	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000
	7	401	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000

	8	207	.000	.000	.000	.000	.000	.000	1.0000	.000	.000	.000	.000	.000	.000
	9	109	.000	.000	.000	.000	.000	.000	.000	1.0000	.000	.000	.000	.000	.000
	10	62	.000	.000	.000	.000	.000	.000	.000	.000	1.0000	.000	.000	.000	.000
	11	25	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.0000	.000	.000	.000
	12	7	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.0000	.000	.000
	13	5	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.0000	.000
	14	1	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.0000
Age 5-year groups	15-19	20	.000	.000	.000	.000	.000	.000							
	20-24	485	1.0000	.000	.000	.000	.000	.000							
	25-29	1475	.000	1.0000	.000	.000	.000	.000							
	30-34	2594	.000	.000	1.0000	.000	.000	.000							
	35-39	3882	.000	.000	.000	1.0000	.000	.000							
	40-44	3263	.000	.000	.000	.000	1.0000	.000							
	45-49	3033	.000	.000	.000	.000	.000	1.0000							
Birth	No	2116	.000	.000											

in-ter-val >= 4 years	Yes	12553	1.000	.000											
	9	83	.000	1.000											
Sex of child	Male	7460	.000												
	Female	7292	1.000												